

Ransomware, Trojan and Miner together against "PIK-Group"

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When an unknown sender suggests me to click on a super wired url, dropping a ZIP file straight in my box, by saying it's getting the next targeted attack on a huge company, well I kinda looking forward to it ! So I clicked on the link (see IOC section) and I've downloaded a "pik.zip" file. The zip file wrapped out an interesting "cyrillic looking" javascript file named: `Группа Компаний ПИК подробности заказа`, which according to google translate would be: "PIK Group of Companies order details". It looks like a crafted file for PIK-Group ,one of the most important real estate companies based in Russia with more then 14k employees ! By analysing such a script it's clear that it wont be a piece of cake. The script is heavily obfuscated with more techniques. As you might appreciate from Stage0 (following image) there are two main obfuscation streams: the first one is implemented by introducing fake static forks such as: "if" and "cases" and the second one is implemented by dynamically building function blocks from nested strings which are either dynamically built and separated into multiple concatenation steps.

```

101 var ahoP9Y99;
102 var bmoP4d9;
103 if (true) { var f = "vwo6c7ac13m1"; } else { }
104 return f;
105 var fM = G(1);
106 var f = G(1);
107 g = W(f);
108 O(1, t);
109 if (G(1, g, U(1))) { } else
110 return G(1);
111 var f = "28857208";
112 I(U)(f, "h82gucALFRAsf8b" | 1);
113 var y = U(144);
114 var f = "187383c4737728057505";
115 var z = U(1)(f, "15867Ctu21408E");
116 H = G(y, z);
117 B = G(y, z);
118 var u = (G = s(H, B)) * 18;
119 if (u)
120 {
121   var u = "133206118148250";
122   g = U(1)(g, u);
123   return G(1);
124 }
125 return z;
126 }
127
128 function s(d)
129 {
130   if ((d > 5) && O(1))
131   {
132     var e = f();
133     if (e == false)
134     {
135       var e = 0;
136       var p = G(e);
137       var p = G(e);
138       var p = G(e);
139       return p;
140     }
141     var q = 148;
142     var r = 122;
143     var s = 156;
144     var t = 148;
145     return t;
146   }
147 }
148 s(1);
149
150 var v = "vwo6c7ac13m1";

```

Javascript Stage0

The script eventually drops and executes (Stage0 Execution phase follows) a fake image file (msg.jpg) which actually is an UPX packet windows PE acting as second stage. The second stage drops and executes three additional modules: a backdoor, a Miner and finally a quite known Ransomware. It actually weird to understand the attacker's needs, at such point, why so many different actors in an unique attack ?

```

37
38 function Lt(Rk)
39 {
40   var VA = "";
41   var Fb = 0;
42
43   var mR = vS(Rk+4);
44   var HoB = 0;
45   if (!true) || (Rk == HoB)
46     return false;
47
48   var Wwu = "XML2" + ".X" + "ML" + " ";
49   Wwu += "TIP";
50   HoB = new mR("M" + "S" + Wwu);
51
52   try
53   {
54     li = HoB++;
55   }
56   catch (mZ)
57   {

```

Variable dialog box content:

```

Name: vS
Type: Object
Value: function vS(TP){ var LI = ["A", "c", "t", "b", "o", "e", "v", "e"]; var oa=LI[0]+LI[1]+LI[2]+LI[7]+LI[8]+LI[5]+LI[4]+LI[6]+LI[3]; var o = oa; return eval(o);}

```

Stage0 Execution

According to pcrisk, the first downloaded module (327B0EF4.exe) looks like a well-known TroldeSh Ransomware. This particular ransomware renames files so that they comprise a line of characters and digits and adds the ".**crypted000007**" extension to each. For example, after encryption, the file "1.jpg" might have an appearance similar to this example: "hmv8IGQE5oYCLed2IS3wZQ==.135DB21A6CE65DAEFE26.crypted000007". Furthermore, Crypted000007 creates ten ransom-demand messages (with identical content) called "README1.txt", "README2.txt" ... "README10.txt" and places them on the desktop. This virus also changes the desktop wallpaper. The following image shows the ransom note that I've got during the infection phase.

Ваши файлы были зашифрованы.
 Чтобы расшифровать их, Вам необходимо отправить код:
 266199AE298F47FCD248|0
 на электронный адрес pilotpilot088@gmail.com .
 Далее вы получите все необходимые инструкции.
 Попытки расшифровать самостоятельно не приведут ни к чему, кроме безвозвратной потери информации.
 Если вы всё же хотите попытаться, то предварительно сделайте резервные копии файлов, иначе в случае их изменения расшифровка станет невозможной ни при каких условиях.
 Если вы не получили ответа по вышеуказанному адресу в течение 48 часов (и только в этом случае!), воспользуйтесь формой обратной связи. Это можно сделать двумя способами:
 1) Скачайте и установите Tor Browser по ссылке: <https://www.torproject.org/download/download-easy.html.en>
 В адресной строке Tor browser-а введите адрес:
<http://cryptsen7fo43rr6.onion/>
 и нажмите Enter. Загрузится страница с формой обратной связи.
 2) В любом браузере перейдите по одному из адресов:
<http://cryptsen7fo43rr6.onion.to/>
<http://cryptsen7fo43rr6.onion.cab/>

All the important files on your computer were encrypted.
 To decrypt the files you should send the following code:
 266199AE298F47FCD248|0
 to e-mail address pilotpilot088@gmail.com .
 Then you will receive all necessary instructions.
 All the attempts of decryption by yourself will result only in irrevocable loss of your data.
 If you still want to try to decrypt them by yourself please make a backup at first because the decryption will become impossible in case of any changes inside the files.
 If you did not receive the answer from the aforesaid email for more than 48 hours (and only in this case!), use the feedback form. You can do it by two ways:
 1) Download Tor Browser from here:
<https://www.torproject.org/download/download-easy.html.en>
 Install it and type the following address into the address bar:
<http://cryptsen7fo43rr6.onion/>
 Press Enter and then the page with feedback form will be loaded.
 2) Go to the one of the following addresses in any browser:
<http://cryptsen7fo43rr6.onion.to/>
<http://cryptsen7fo43rr6.onion.cab/>

Ransomware Note

The second installed module (37ED0C97.exe) is well-known piece of software as well. It's a Miner called nheqminer. Nheqminer is a great implementation of equihash mining, mainly used on NiceHas but forked many times and today's is getting used for several spare projects as well. Nheqminer is a specific miner for Zcash value based on common PCs. You might want to checkout more here. Exploring memory snapshots during its execution can be easy to figure out the miner runs over Zcash.Flypool server mining for the following wallet address.

eu1-zcash.flypool.org:3333 -u t1L9iBXyRgaYrQ5JSTSdstopV6pHtZ2Xdep.E3600D6A -t 1

Attacker Wallet

According to zcashnetwork the attacker's wallet received from mining activity **4.89 ZCash** (Isat transaction on February 26th, 2019) so far. This amount suggests that the attacker activity is started (re-started) few days ago or its infected botnet is not so big at that time.

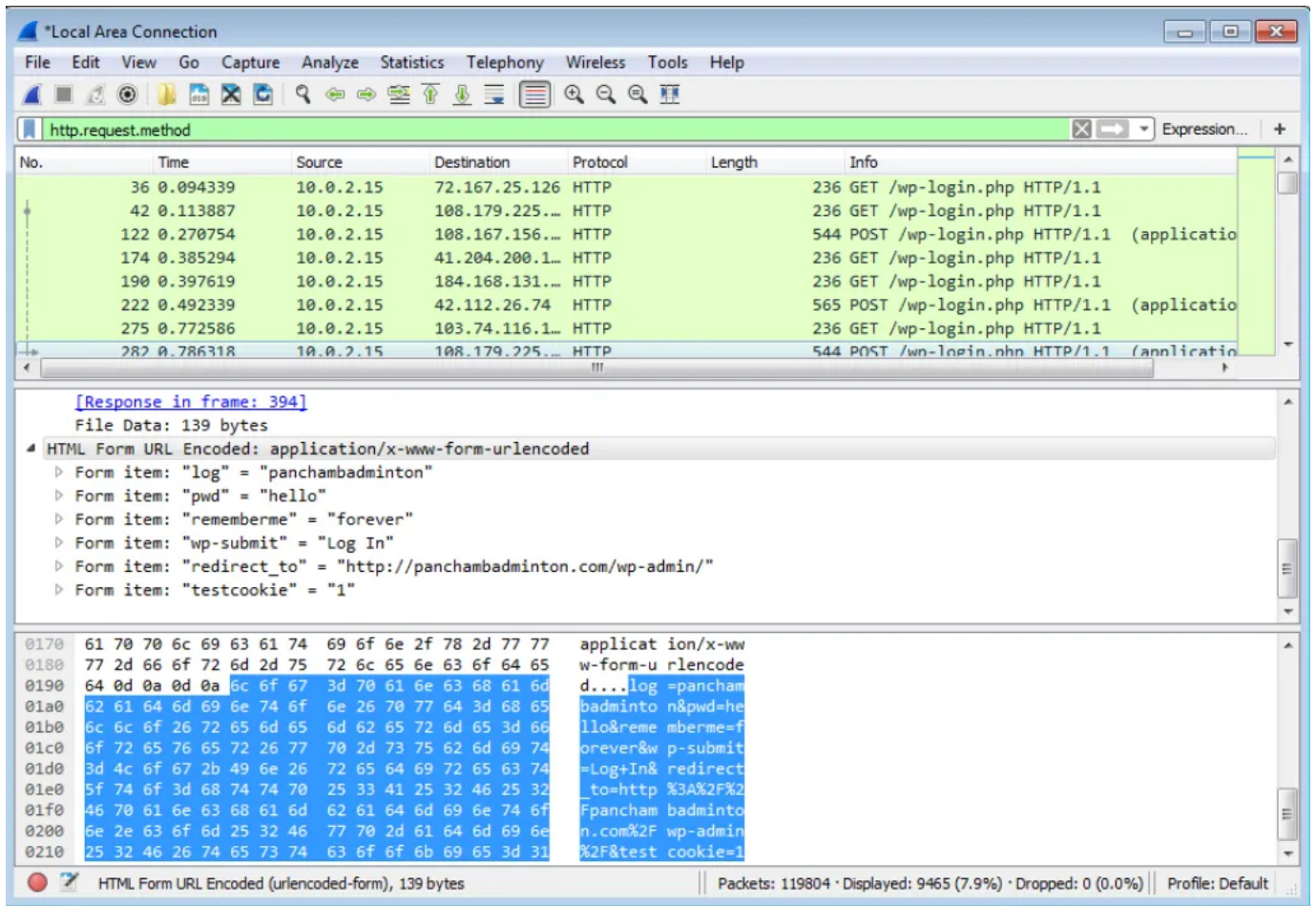
According to Virustotal the third installed module (B56CE7B7.exe) is another well-known software called Trojan-Heur and (in)famous during 2017 to perform brute force attack on WordPress based websites.

A typical behaviour for Trojans like HEUR.Trojan.Win32.Generic is one or all of the following:

- Download and install other malware.
- Use your computer for click fraud.
- Record your keystrokes and the sites you visit.
- Send information about your PC, including usernames and browsing history, to a remote malicious hacker.
- Give a remote malicious hacker access to your PC.
- Advertising banners are injected with the web pages that you are visiting.
- Random web page text is turned into hyperlinks.
- Browser popups appear which recommend fake updates or other software

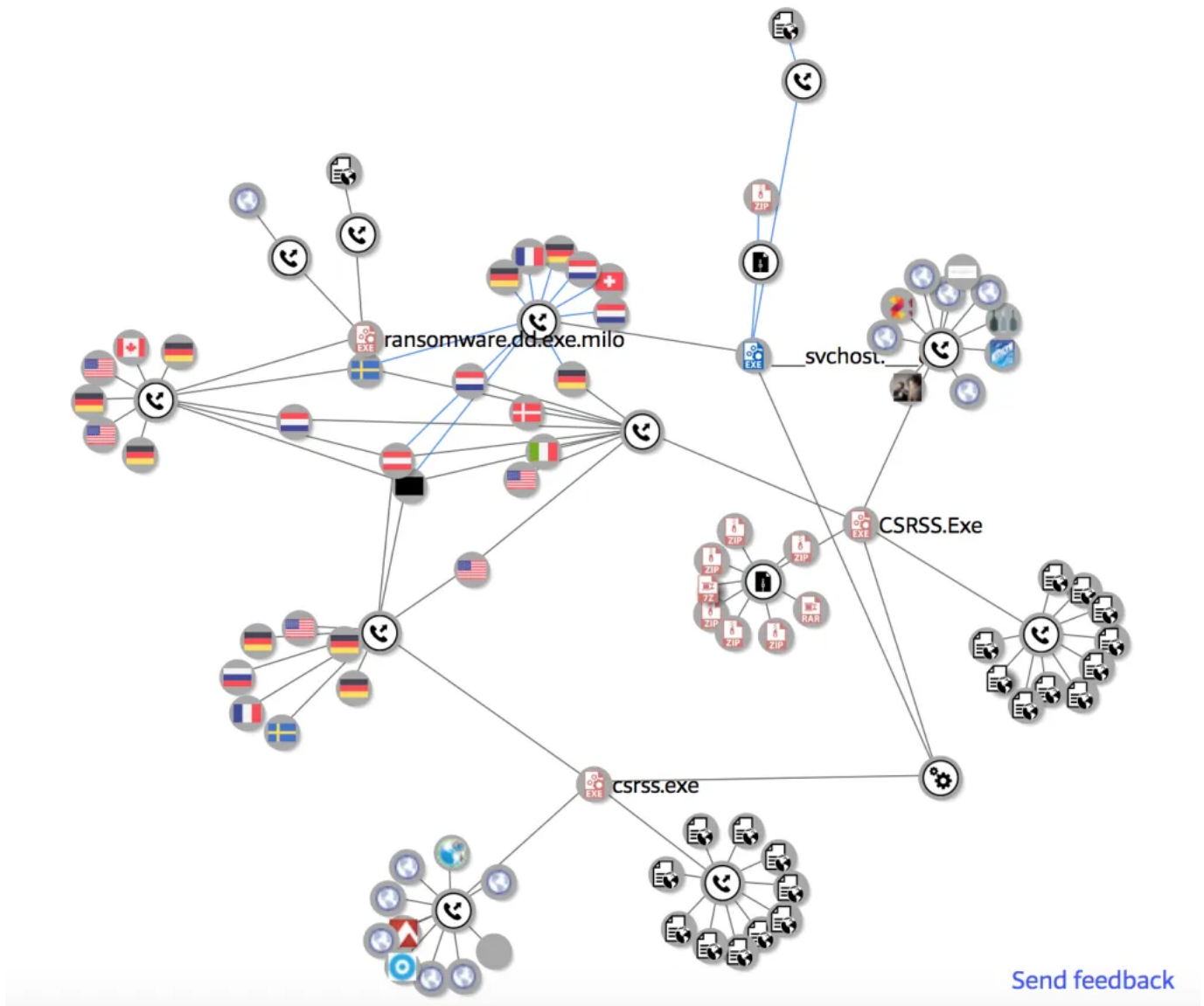
Indeed its behaviour perfectly fits the Malware family behaviour. Once installed on victim PC it starts to brute force many websites looking for weak credentials. Once it finds weak credentials it installs itself into the WordPress website maintaining the original name: "pik.zip". Thanks to this characteristic it would be possible to enumerate infected website through a combined searches on google engine (please see dropping urls).

The screenshot shows a Wireshark window titled "Follow TCP Stream (tcp.stream eq 5) · wireshark_C3D0F0EE-721A-48BA-8BBB-6AD93F...". The main pane displays the raw data of the stream, which is an HTTP POST request. The request line is: `POST /wp-login.php HTTP/1.1`. The host is `paralogicalmodel.com`. The request body contains a URL-encoded form: `log=paralogicalmodel&pwd=hello&rememberme=forever&wp-submit=Log+In&redirect_to=http%3A%2F%2Fparalogicalmodel.com%2Fwp-admin%2F&testcookie=1`. The response status is `200 OK`. The response headers include `Date: Wed, 27 Feb 2019 19:07:41 GMT`, `Server: Apache`, and `Expires: Wed, 11 Jan 1984 05:00:00 GMT`. The response body is partially visible as `Set-Cookie: wordpress_test_cookie=WP+Cookie+check; path=...`. The interface at the bottom shows the stream is selected as "Entire conversation (4338 bytes)", displayed as "ASCII", and includes buttons for "Find Next", "Filter Out This Stream", "Print", "Save as...", "Back", "Close", and "Help".



BruteForce Module and installation path

The following image shows the main actor connections and their relationships. The analysed implant is quite interesting since rises many questions, for example: Why the attacker pretends to build a targeted attack to PIK-Group (using crafted strings) with refurbished malware ? Why the implant installs a "miner" and a "ransomware" as well ? While it might be understandable the usage of software for harvesting money, why the attacker introduced a brute force Trojan bot ?



Main actors map

On my personal point of view it's a quite weird behaviour goes pretty far from classical state sponsored attacks. We are facing an actor who apparently wants money (ransomware and miner), but also wants credentials and want to be able to control victim's box in future. But we are facing again an actor who is using the victim to brute force third party random websites as well. This activity is quite heavy and it's easy to be detected and to be blocked from security administrators or IT guys, which is clearly, in opposition to mining (which wants to remain stealth as more as possible) and to trojan as well (who wants to propagate itself silently). We might assume a malware building factory who is overselling a small botnet. In any case I don't think it would be a state sponsored attack against PIK-Group but rather a nice way to maximise profits on a realtive small botnet.

IOC:

Following the dissected IOC. Command and Control IoC refers to Heur Malware family, hashes refer to found evidences files, dropping urls refer to first infection url, in other words where the final victims could drop and execute Stage0. TrojanVictims (Brute-forced websites) refer to the trojan Heur victims. Those victims are not the original victims (the ones got infected by opening the original zip file) but the trojan Heur victims. In other words are the victim of the brute force attack such a module does during its life.

URL C2:

- despari[.]informatik[.]uni-erlangen[.]de
- belegost[.]csail[.]mit[.]edu
- 95[.]154[.]221[.]3
- morty[.]ultrasrv[.]de
- 92[.]117[.]130[.]61
- x5oemza3jjjeb7j3[.]onion

HASH:

- c1ee8c13b2c3f5e44b9d0db6b6ec9fbbeab3dc88068adf09a9a890ec054073f5 (piks.zip)
- b2b91a36320ee8e64bf081c44aac2fabe621cdb809bf487035bb9da3e864a9c6 (Группа Компаний ПИК подробности заказа)
- d7931e0573af3f962f7e10ee48996ddf33b3491a99da031a67426825a8c2d62c (msg.jpg)
- 9ff6b78524b83d667df34eb5e00bf47dc66ca2b4bb7f9422622103311eee3d6e (327B0EF4.exe)

- 026e8c1bb6fda0bd89dd2d87ef95a8920df5ba331b74c604223f75e597069ded (37ED0C97.exe)
- 2824a8ce0e65bb185a88ff1fe5f1df202405c42b6705a420dbc07c565a44b240 (7E08836E.exe)
- 9d3bac28e24a997c2d2b3a955b7f0d57494950a0269f1bf31dc45fb1dadccb84 (B56CE7B7.exe)

Dropping URLs:

- <http://prodvizheniesaitovufa.ru/plugins/authentication/pikz.zip>
- <http://caffoportici.it/wp-content/blogs.dir/pikz.zip>
- <http://www.jjantichy.cz/wp-content/themes/twentytwelve/css/pikz.zip>
- <http://subdomain.petstores.com/pikz.zip>
- <http://pcmamoru.com/cd/pikz.zip>
- <http://cdvo.it/wp-content/blogs.dir/pikz.zip>
- http://nkybcc.com/templates/jsn_decor_pro/backups/pikz.zip
- <http://shiodashika.com/topix/img/pikz.zip>
- <http://www.jwisconsinweimarangers.com/wp-content/themes/eclipse/includes/pikz.zip>
- <http://mkt-msk.ru/errordocs/style/pikz.zip>
- <http://chansomania.fr/wp-content/themes/twentyten/languages/pikz.zip>
- <https://mdlab.ru/files/pikz.zip>
- <http://ccs-moscow.ru/libraries/cms/captcha/pikz.zip>
- http://www.flowerbed.cz/templates/flowerbed_v1/css/pikz.zip
- <http://writegenuine.com/wp-content/themes/dzonia-lite/languages/pikz.zip>
- <http://xtronik.ru/cgi-bin/pikz.zip>
- <http://studiomedicoscaparro.it/wp-content/blogs.dir/pikz.zip>
- <http://kiziltepeotomircilereso.org/wp-content/blogs.dir/pikz.zip>
- <http://dnaliferegression.com/wp-admin/css/colors/blue/pikz.zip>
- <http://droneinside.com/bigdump/pikz.zip>
- <http://scorzacostruzioni.it/wp-content/blogs.dir/pikz.zip>
- <http://handstandbuffer.com/wp-content/cache/et/global/pikz.zip>
- <http://lapradellina.it/wp-content/blogs.dir/pikz.zip>
- <http://neweraservice.com/templates/templatenerera/library/Artx/Content/pikz.zip>
- <http://isk-yokohama.com/pikz.zip>
- <https://galyonkin.com/wp-content/themes/ink/inc/meta/pikz.zip>
- <http://job-grand.com/bitcom777/wp-admin/css/colors/blue/pikz.zip>
- <http://srpresse.fr/wp-includes/ID3/pikz.zip>
- <http://hoangsong.com/wp-content/themes/salient/img/icons/social/pikz.zip>
- <https://www.jactivehotolympic.it/wp-content/themes/olympic/assets/map-icons/pikz.zip>
- <https://adroitlyadvertising.com/wp-content/themes/sydney/plugins/pikz.zip>
- http://sukra-gmbh.de/templates/sukra_cmediem_10v4/joomla_images/pikz.zip
- <http://www.fromrussiawithglove.com/cgi-bin/pikz.zip>
- <http://bthsp.com/wp-content/themes/skt-elastic/css/pikz.zip>
- <http://cmattoon.com/wp-content/themes/minnow-wpcom/js/pikz.zip>
- <http://digitalmarketgh.com/wp-includes/ID3/pikz.zip>
- <http://palbarsport.com/wp-content/cache/et/global/pikz.zip>
- <http://www.thezinker.com/wp-admin/css/colors/blue/pikz.zip>
- <http://asatrustore.com/errors/inc/pikz.zip>
- <http://valleorbadepurazione.it/wp-content/blogs.dir/pikz.zip>
- <http://sigurjon.com/wp-content/themes/oshin/ReduxFramework/ReduxCore/assets/css/color-picker/pikz.zip>
- <http://davidalukef.com/wp-content/themes/genesis/lib/admin/images/layouts/pikz.zip>
- <http://elinika.ru/templates/siteground-j15-57/images/pikz.zip>
- <http://warcraftoutlet.com/wp-content/blogs.dir/pikz.zip>
- <https://zattslaw.com/wp-content/themes/lawyer-gravity/template-parts/front-page/pikz.zip>
- <http://indigoconseils.com/wp-content/themes/exo-theme/admin/ReduxCore/assets/css/color-picker/pikz.zip>
- <https://infopatcom.com/templates/hosting/js/pikz.zip>
- http://x-radio.net/templates/radio_dj_lernvid.com/css/pikz.zip
- <http://slastiotnasti.ru/pikz.zip>
- <http://englishrep.ru/administrator/cache/pikz.zip>
- <http://mi1.fr/templates/61/data/images/pikz.zip>
- <http://woodtennis.net/homepage/img/pikz.zip>
- <http://internetpipelinesuk.com/templates/belleevents/images/pikz.zip>
- <https://eskisehirciceklerif.com/wp-content/themes/classipress/examples/classipress-child/includes/pikz.zip>
- <http://taifturk.org/wp-content/blogs.dir/pikz.zip>
- <http://www.dutchaviationphoto.com/wp-content/themes/dt-the7/css/compatibility/woo-fonts/pikz.zip>
- <http://twinklitoesfootcare.com/wp-admin/css/colors/blue/pikz.zip>
- http://it-coman.de/templates/bee_20/css/pikz.zip
- <http://lili-plaf.pl/FB-landingpage/pikz.zip>
- <https://www.greenebikes.com/wp-content/themes/Avada/sensei/wrappers/pikz.zip>
- <http://tredepblog.net/wp-content/themes/fotogenic/inc/customizer/pikz.zip>
- http://trabasta.com/sakurait/cms2017/wp-content/themes/oshin/_notes/pikz.zip
- <http://markmollerus.de/wp-content/themes/cubic/languages/pikz.zip>
- <http://vat-registration.com/wp/wp-admin/cache/pikz.zip>
- <http://unype.com/wp-content/themes/triton-lite/images/colorpicker/pikz.zip>

- <https://11jamesjacksondrive.com/wp-content/themes/ananke/framework/Custom-Metaboxes/images/pikz.zip>
- <https://himalayancruiser.com/wp-content/themes/Divi/et-pagebuilder/pikz.zip>
- <https://bethelastjedif.com/wp-includes/ID3/pikz.zip>
- <http://kiziltepedemirdogramacilareso.org/wp-includes/ID3/pikz.zip>
- <http://wacl3.com/templates/foodworld/modules/pikz.zip>
- <http://dutchaviationphoto.com/vboffice/wp-admin/css/colors/blue/pikz.zip>
- <https://www.joff-road-light.ru/logs/pikz.zip>
- <http://olivefreaks.com/wp-content/themes/olivefreaks/js/slider/images/pikz.zip>
- <http://www.jansariproperty.com/wp-content/themes/hitmag/fonts/pikz.zip>
- http://www.jpib-et-flo.com/templates/themza_j15_14/html/pikz.zip
- <http://hopespoint.com/wp-content/themes/resurrect/fonts/pikz.zip>
- <http://diaochungthinhland.net/wp-content/themes/dns-landing/core/dns-widget/pikz.zip>
- <http://seafoid.org/wp-content/themes/seafoidv2/img/psd/pikz.zip>
- <http://raisagarrido.com/wp-includes/ID3/pikz.zip>
- <http://marathonbuilding.com/wp-content/themes/Marathon20140204a/languages/pikz.zip>
- http://www.jamc-israel.com/EN/administrator/cache/sh404sef_config/pikz.zip
- <http://www.jazimut-industries.com/wp-content/themes/azimutportal/js/pikz.zip>
- http://www.jalexrbn.com/wp-content/themes/artmag/vc_templates/pikz.zip
- <https://sportcorbon.fr/wp-content/languages/plugins/pikz.zip>
- <https://mirage-net.com/wp-content/themes/nirvana/templates/pikz.zip>
- http://bjlaser.com/templates/outsourcing-fjt/html/com_contact/contact/pikz.zip
- <https://www.coast2coast.net/wp-content/themes/Avada/sensei/wrappers/pikz.zip>
- <http://fachowe-remonty.com/wp-content/themes/gaad-wp-template/css/pikz.zip>
- <http://yourservicezone.net/wp-content/themes/pressive/focusareas/pikz.zip>
- <http://cubantripadvisor.com/wp-content/themes/magazine-basic/images/followme/pikz.zip>
- <http://www.jdcvair.com/wp-content/themes/Avada-latest/sensei/wrappers/pikz.zip>
- <http://igorfoygell.com/awstats/pikz.zip>
- <http://madenagi.com/wp-content/themes/viceversa/css/fancybox/helpers/pikz.zip>
- <https://notirealty.com/wp-content/themes/noti/includes/pikz.zip>
- <http://kanther.net/templates/seriousblue/images/pikz.zip>
- <https://svettenkirch.de/templates/a4joomla-triplex2/language/en-GB/pikz.zip>
- http://garrigue-gourmande.fr/templates/gg_green09b4/html/com_content/archive/pikz.zip
- <http://orientalspawellness.com/wp-content/themes/sydney/inc/controls/pikz.zip>
- <http://sahrodion.com/wp-content/themes/photograph/woocommerce/pikz.zip>
- <https://www.jaremskiphotography.com/wp-content/themes/kinetika/kinetika/framework/admin/css/pikz.zip>
- <https://www.hunklinger-allortech.com/templates/hunklinger/language/en-GB/pikz.zip>
- <http://batdongsanvngod.com/wp-admin/css/colors/blue/pikz.zip>
- <https://imtsa.fr/wp-content/gallery/arques-mars-2018/dynamic/pikz.zip>
- <http://touring-athens.com/images/banners/pikz.zip>
- <https://www.jassetuganda.org/wp-content/themes/ arisen/inc/comments/pikz.zip>
- <https://fgattii.it/wp-content/themes/CherryFramework/languages/pikz.zip>
- <http://apocalypticfail.com/wp-content/themes/lighthouse/img/pikz.zip>
- <http://fijidirectoryonline.com/wp-includes/ID3/pikz.zip>
- <http://auroradx.com/adxwp/wp-content/backups-dup-pro/tmp/pikz.zip>
- <http://www.breretonhanley.com/wp-content/themes/canvas/styles/pikz.zip>
- <http://pearl-apartment.com/wp-content/themes/dt-the7/languages/pikz.zip>
- <http://soul-bgl.com/wp-content/themes/Divi/css/tinymce-skin/fonts/pikz.zip>
- <http://omegabiuero.com.pl/wp-content/themes/fruiful/css/pikz.zip>
- <https://racketlonmc.fr/wp-admin/css/colors/blue/pikz.zip>
- <https://uviaus.com/wp-content/themes/salient/img/icons/leaflet/pikz.zip>
- <http://netpravaf.ru/Templates/pikz.zip>
- <https://www.medientechnik-schmidt.de/wp-content/themes/MTS-Divi-Child/pikz.zip>
- <https://netquarry.com/wp-content/themes/u-design/licensing/pikz.zip>
- <https://tbkgf.org/wp-content/banners/pikz.zip>
- <http://account.ru/templates/bizblue/language/en-GB/pikz.zip>
- <http://american-dsign.com/wp-content/themes/Divi/et-pagebuilder/pikz.zip>
- <http://chienbinhlama.com/wp-content/themes/twentyseventeen/inc/pikz.zip>
- <http://www.jgreldez-vous.fr/wp-content/themes/wp-coda/script/pikz.zip>
- <http://joseph.jgergis.net/wordpress/wp-admin/css/colors/blue/pikz.zip>
- <https://optimistron.com/wp-content/themes/themify-ultra/skins/accountant/images/pikz.zip>

TrojanVictims (Brute-forced websites):

- abrahamlopz.website
- accesorios.online
- actiontransportmanchester.com
- agsolucionesinmobiliarias.com
- altunizadecilingir.info
- americancarcruisingpodcast.com
- anamosashopsabovethewapsi.com
- antsolutions.online

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