DomainTools

SPRING 2024

The DomainTools Report

# Patterns of Malicious Infrastructure

domaintools.com

# Introduction

Welcome to the Spring 2024 edition of the DomainTools Report. Since the first DomainTools Report in 2015, we have sought to explore our stores of domain registration, hosting, and content-related data to surface patterns and trends that might be of interest to security practitioners, researchers, and anyone else interested in the suspicious or malicious use of online infrastructure. Most of the reports to date have had specific areas of focus, ranging from TLDs (top level domain) and email privacy providers (2015) to affixes in domain names (2016) to domain "blooms" and "spikes" (Spring 2021).

In this edition, we again focus on concentrations of malicious activity by the same six categories we studied in the last two editions of the report. We expect that some criteria (such as top level domain, IP autonomous system number, and IP geolocation) will remain relevant over the foreseeable future; that is, as datapoints related to domain names, these are unlikely to become less forensically-valuable unless the Internet's fundamental structure changes. Other datapoints may wax and wane in relevance.  For example, email privacy providers as a category that we studied in the first DomainTools Report, are dramatically less relevant in the post-GDPR world of default privacy for most registrations. Similarly, as you will read in the section on SSL Certificate Authorities, there are few strong correlations to malicious activity in the overall data (though of course for individual domains, a given CA might still sound a note of caution to an analyst).

The constant across all of these reports is our interest in providing insights into where malicious activity lurks on the Internet, with the aim of ultimately helping the community continue to improve their practices at staying ahead of those entities wishing to do harm online.

# Criteria & Methodology

## Domain Characteristics Evaluated

In this report, we examined the following features of a domain:

- **Top Level Domain (TLD);** for example, .com or .net
- **IP Autonomous System Number (ASN**); these represent an aspect of the domain's hosting
- **Name server ASN**; these represent the hosting of the name server associated with a domain
- **IP Geolocation:** the country code associated with the location of the domain's IP address
- **Registrar:** the entity through which the domain was registered
- **SSL Certificate Authority (CA):** the CA for certificate(s) associated with domains

We chose these features because **they are often used by defenders and security researchers as part of a process of building out a better understanding of a domain**. Seasoned practitioners often develop intuitions about the implications of a given feature, based on their experience, expertise, and judgment in the analysis of adversary assets. In many cases, the data seen at scale tend to support those intuitions. Certain TLDs, for example, have reputations among security analysts as being dangerous "neighborhoods" of the Internet, and as this and previous DomainTools Reports show, there are indeed some TLDs that have high concentrations of malicious domains. Other criteria are more ambiguous, such as the aforementioned SSL CAs.

# Methodology

## Candidate Domains

The DomainTools Iris database includes around 360 million currently-registered domains. How did we determine which of the candidate domains represent threats? There were two components to this. We identified domains that were known-bad by checking the domain names against several well-known industry blocklists which give indications of malware, phishing, or spam activity.

Secondly, we focused on those domains that were active (as of the report data snapshot), and therefore capable of packing a punch. Thus, **we excluded domains that appear to be dormant**. We did this by cross-checking the domains against our passive DNS sources; only those domains that have recently shown up in passive DNS are candidates for signal strength calculations.

We also imposed thresholds for absolute numbers of domains associated with each domain characteristic, so as to eliminate those entities that had extremely small populations of domains associated with them. **To be part of the evaluation, the characteristic had to have at least 1,000 active domains of the threat type in question**. For example, for Top Level Domain, or TLD, when looking at the highest signal strengths for phishing, we eliminated any TLDs that had fewer than 1,000 phishing domains. We then sorted the remaining TLDs by signal strength, and this composed our Top 10 list in that category.

This thresholding implies that **there exist some concentrations of malicious activity that may have higher signal strengths than what is included in the findings below**, but such hotspots are so small that they are unlikely to represent major threat vectors overall (of course, that doesn't mean that any given SOC couldn't have an encounter with a domain from one of those hotspots).

## Signal Strength

The tables in this report are populated and sorted based on the strongest signals for phishing, malware, or spam activity associated with the populations of known-bad domains sharing the characteristic (such as TLD, IP ASN, etc). We developed this approach because when we created our Domain Risk Score machine learning algorithms, it was critical to produce scoring that achieved a good balance between a low false positive rate and an effective catch rate. A high signal strength value means that the characteristic in question is over-represented in the population of known bad domains, as compared with neutral ones.

The larger the proportion of malicious domains in a given population (an IP address, a name server, a registrar, etc) the higher our confidence that any unknown domain from that population may be involved in the threat in question. In actual practice, many defenders treat these signals in exactly this way: many characteristics of a domain (such as certain TLDs or certificate authorities) are viewed as caution signs. Signal strengths closer to 1.00 indicate a neutral signal, and if the signal strength is below 1.00, the item in question is actually more associated with neutral/good domains than with malicious ones. **There were some cases in which, for a given threat type, our Top 10 lists had fewer than ten entities with signals above 1.00** - in other words, there were some items in some of these lists that signal more goodness than badness—a phenomenon we first noted in the Fall 2021 edition of the Report.

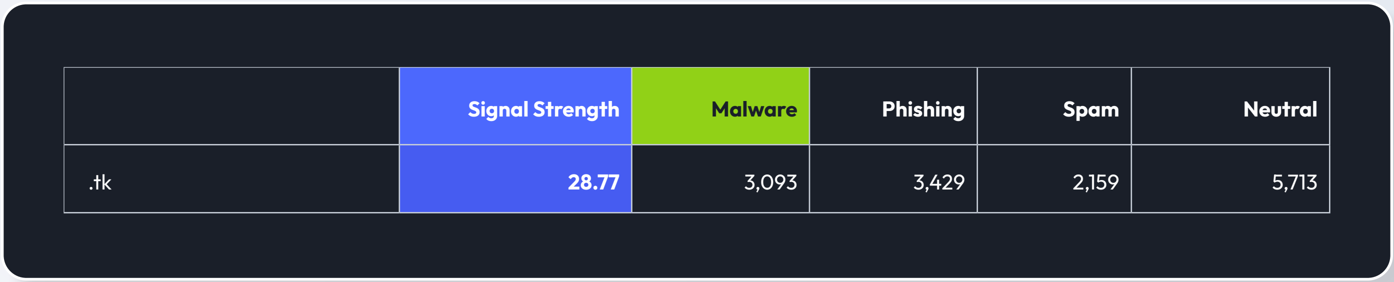
> A high signal strength value means that the concentration of malicious domains associated with that characteristic is high. When we know that a large proportion of the domains in a given population (an IP address, a name server, a registrar, etc) is malicious, this raises our confidence that any unknown domain from that population is relatively likely to be involved in the threat in question.

## Snapshot in Time

For our calculations, **we took a snapshot of the domains in existence and active as of mid March, 2024**.

## Interpreting the Data

In each of the following six sections, we show “Top Ten” tables, sorted by the signal strength, for each of the three threat types (phishing, malware, spam). Each table also includes the actual counts of domains associated with the item. As an example, consider this row of data from the TLD section:



| | Signal Strength | Malware | Phishing | Spam | Neutral |
|---|---|---|---|---|---|
| .tk | **28.77** | 3,093 | 3,429 | 2,159 | 5,713 |

The TLD **.tk** has a malware  signal strength of **28.77**, and there are 3,093 domains in that TLD whose chief threat type is malware, according to the blocklists we used. For comparison, we also give the numbers of phishing, spam, and neutral domains associated with the TLD. As a reminder, **all domains under consideration had shown recent activity shown in passive DNS records** as of the time the snapshot was taken, so the numbers do not include the inactive domains associated with that TLD.

In each Top Ten list, the individual entities on the list that were repeats from the previous report in Spring of 2023 are shown in **bold**. Entities with **bold*** indicate that they not only repeat, but repeat in the same rank as in the last report. And those with ***bold**** are multiple (3x or more) repeaters that are also in the same position as last time.

It’s important to keep in mind what signal strength represents, and what it does not. Most importantly, **a high *signal strength* for maliciousness does not necessarily correspond to a high *absolute number* of malicious domains.** The purpose of the report is not to show where the highest numbers of dangerous domains are, but rather what data points should be considered the strongest indicators that something unsavory might be afoot.

# Findings

# Top-Level Domains (TLDs)

It's usually a safe bet that the most populous TLDs such as .com, .net, .org, .co.uk, and so forth, will have the most malicious domains associated with them, but there are a number of country code (.tk, .gq), and new generic (.monster, .live) TLDs that have gained notoriety in the cybersecurity community for hosting malicious domains. There are several reasons for this, including extremely inexpensive (or sometimes free) domain registration and lax enforcement policies. But when defenders say that they automatically distrust certain TLDs, they have plenty of reason for doing so, as the following Top Ten lists will show—just as in 2023, gTLDs abound in this year's Top Ten lists.

That said, a notable feature of all three threat types for TLDs is that **the signal strengths are substantially milder**, particularly in the spam category. What this means for defenders is that seeing one of the TLDs represented in our Top Ten lists as an indicator on their network is not as clear a sign of maliciousness as it was last year. Most analysts will still pay attention to such domains, which is appropriate; but certain activities, such as wholesale blocking of entire TLDs, could result in higher false positive rates than it might have in the past.

**But the big story in TLDs, which dropped shortly after we published the March 2023 report, was Freenom's exit from registration** of domains in several of the TLDs that have frequented our lists, including .tk, .ga, .gq, .ml, and .cf. Freenom returned control of these country-code TLDs to the countries to which they were actually assigned by ICANN.
And as you will see in the three top ten lists in this category, several of these TLDs remain on the lists with high signal strengths, but the numbers of domains associated with them are dramatically lower. The .gq TLD, for example, topped our phishing Top Ten list but had a total (for the table row) of 4,160 domains, vs. 80,128 a year ago—more than an order of magnitude fewer domains, albeit with a distribution that still gives .gq high signal strength in phishing.

When doing some extreme "low flying" over the data, we found that there were a few domains that existed before Freenom's exit, and still existed at the time of our 2024 snapshot, that were on our blocklists. Examples are `instagram-copyright-team[.]gq`, `instagramclient[.]gq`, `freenomisratelimitingme[.]gq`, `blackhatseoservices[.]tk`, `yahootk[.]tk`, `qnap[.]tk`, `instagram-badge-verify[.]cf`, `chronopostt[.]cf`, `1and1[.]cf`, and `freenomisratelimitingme[.]cf` (the shade against Freenom comes through clearly!).

## Phishing

We saw some turnover in the top ten, as we did last year, although it was slightly lower this year. The signal strengths were also milder, topping out at 50.59 for .gq this year, vs. 102.49 for .cyou last time around. Speaking of .gq, it moved up from eighth spot last year, while two other TLDs made the Top Ten lists in multiple threat types—.tk was in all three threat categories' top ten lists, and .live was in two.

| March 2024 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---|---|---|---|---|
| **.gq** | **50.59** | 1626 | 537 | 471 | 1526 |
| .cf | **28.68** | 1420 | 704 | 428 | 2351 |
| .tk | **28.50** | 3429 | 3093 | 2159 | 5713 |
| .lol | **19.30** | 19743 | 4624 | 575 | 48557 |
| .party | **13.84** | 1039 | 46 | 20 | 3564 |
| .autos | **12.11** | 4296 | 660 | 188 | 16838 |
| **.live** | **10.98** | 28353 | 13254 | 5241 | 122584 |
| .support | **8.89** | 1267 | 254 | 200 | 6769 |
| **.monster** | **8.64** | 3254 | 2040 | 317 | 17892 |
| **.top** | **7.19** | 143892 | 72499 | 31712 | 950381 |

| March 2023 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---|---|---|---|---|
| **.cyou** | **102.49** | 35659 | 21,683 | 409 | 18,834 |
| .cfd | **85.98** | 3944 | 2,100 | 504 | 2,483 |
| **.top** | **51.69** | 105949 | 27,326 | 13,543 | 110,951 |
| **.buzz** | **51.33** | 16335 | 4,774 | 610 | 17,227 |
| **.rest** | **49.17** | 1694 | 456 | 800 | 1,865 |
| .ga | **36.17** | 36469 | 10,294 | 6,799 | 54,575 |
| .quest | **34.55** | 1629 | 915 | 541 | 2,552 |
| .gq | **32.16** | 23985 | 9,364 | 6,407 | 40,372 |
| **.monster** | **31.39** | 2530 | 1,327 | 2,303 | 4,363 |
| **.live** | **26.87** | 20446 | 3,286 | 12,110 | 41,183 |

## Malware

The Top Ten list for malware had more turnover than the phishing list, with only two repeaters. Again, this may be attributable to the Freenom exit; but we also saw lower signal strength overall in this category, with .tk showing 28.77 in first spot this time, vs. .cyou's 135.09 signal strength in 2023. Notable in this list is gTLD .online, with more domains than any other top ten TLD, by a factor of over three times. Two of the TLDs in the Malware list—.live and .monster—also appeared in the phishing list above.

| March 2024 | Signal Strength | Malware | Phishing | Spam | Neutral |
|---|---|---|---|---|---|
| .tk | **28.77** | 3093 | 3429 | 2159 | 5713 |
| .pics | **7.76** | 3596 | 1673 | 677 | 24641 |
| .today | **7.24** | 12834 | 2235 | 386 | 94210 |
| .life | **6.83** | 12290 | 14175 | 2562 | 95565 |
| .online | **6.66** | 103945 | 43251 | 9435 | 830008 |
| .space | **6.27** | 11767 | 5966 | 3334 | 99758 |
| **.monster** | **6.06** | 2040 | 3254 | 317 | 17892 |
| .live | **5.75** | 13254 | 28353 | 5241 | 122584 |
| .link | **5.68** | 5668 | 3027 | 929 | 53032 |
| **.buzz** | **5.30** | 11010 | 8514 | 1312 | 110397 |

| March 2023 | Signal Strength | Malware | Phishing | Spam | Neutral |
|---|---|---|---|---|---|
| .cyou | **135.09** | 21,683 | 18,834 | 409 | 18,834 |
| .cfd | **99.24** | 2,100 | 2,483 | 504 | 2,483 |
| .monster | **35.69** | 1,327 | 4,363 | 2,303 | 4,363 |
| .buzz | **32.52** | 4,774 | 17,227 | 610 | 17,227 |
| **.top** | **28.90** | 27,326 | 110,951 | 13,543 | 110,951 |
| .gq | **27.22** | 9,364 | 40,372 | 6,407 | 40,372 |
| .click | **24.76** | 4,178 | 8,831 | 11,403 | 19,799 |
| .ga | **22.13** | 10,294 | 54,575 | 6,799 | 54,575 |
| .icu | **21.76** | 2,070 | 4,779 | 606 | 11,163 |
| **.xyz** | **15.06** | 32,687 | 85,505 | 7,215 | 254,684 |

## Spam

Of the three threat types, spam had the biggest drop in signal strength vs. 2023, from 692.36 to 44.80. Other features of this Top Ten list are somewhat similar to last year's, in that the counts were relatively comparable and there was a fairly high level of turnover, with only three repeaters (though this is a change from last year, when all ten TLDs were new to the list). As noted earlier, .tk, which tops the spam list, featured in all three threat types this year.

| March 2024 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---|---|---|---|---|
| **.tk** | **44.80** | 2159 | 3429 | 3093 | 5713 |
| **.tokyo** | **26.61** | 4172 | 268 | 103 | 18586 |
| .ws | **13.91** | 1310 | 450 | 161 | 11169 |
| .best | **13.35** | 2485 | 2439 | 1968 | 22071 |
| .wiki | **9.90** | 1337 | 641 | 243 | 16004 |
| .cn | **8.49** | 37455 | 58125 | 11868 | 522885 |
| .media | **8.08** | 1312 | 818 | 312 | 19248 |
| **.click** | **5.24** | 7078 | 18074 | 11804 | 160165 |
| .ng | **5.10** | 1915 | 1298 | 1530 | 44494 |
| .cc | **5.07** | 8680 | 14866 | 12619 | 203020 |

| March 2023 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---|---|---|---|---|
| .beauty | **692.36** | 3,461 | 972 | 249 | 1,341 |
| .click | **154.50** | 11,403 | 8,831 | 4,178 | 19,799 |
| .monster | **141.60** | 2,303 | 2,530 | 1,327 | 4,363 |
| .live | **78.88** | 12,110 | 20,446 | 3,286 | 41,183 |
| .gq | **42.57** | 6,407 | 23,985 | 9,364 | 40,372 |
| .ga | **33.42** | 6,799 | 36,469 | 10,294 | 54,575 |
| .top | **32.75** | 13,543 | 105,949 | 27,326 | 110,951 |
| .tokyo | **27.57** | 1,531 | 603 | 379 | 14,899 |
| .tk | **26.95** | 7,093 | 28,151 | 8,690 | 70,612 |
| .cf | **24.15** | 6,844 | 28,265 | 8,451 | 76,030 |

# IP ASNs

For this category, we provide both the Autonomous System number itself and the organization name to which the ASN is delegated. As you read the ASN tables, note that, as in the last two editions, **the signal strengths at the top are dramatically higher than what we recorded in the TLD lists**. Note, too, the extraordinary ratios between the numbers of malicious domains vs neutral domains in some of these ASNs, or between one threat type and another (for example, ASN 198953 has 1695 phishing domains and not a single neutral one). With each AS in this and the following section, we provide its country code of registration in parentheses.

## Phishing

**We saw a DomainTools Report first this year, with a hosting AS** (ASN 198953, Proton 66 OOO of Russia) **having exactly zero neutral domains**. This gives this AS a signal strength of infinity. **Please, dear reader, do not allow any traffic at all to this ASN!** Likewise the next two, which are almost entirely devoted to malicious activity, with 1 and 11 neutral domains, respectively, vs. hundreds to thousands of phishing domains. (Your report's authors speculate that the presence of those twelve neutral domains in these ASNs may simply reflect that the threat intelligence feeds we use for categorizing threats may simply not have gotten around to classifying those domains as of our data snapshot date. And you'll see a "bonus" table below the March 2024 snapshot, prompted by that infinite score—read on!)

Only two of the ASNs on this list were on last year's list—41564, Orion Network Limited and 58065, Packet Exchange Limited (both of Great Britain)—repeated from last year. Those two ASNs also feature in the malware Top Ten list, as you will see.

| March 2024 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---|---|---|---|---|
| 198953 Proton66 OOO, RU | ∞ | 1695 | 18 | 85 | 0 |
| 49943 ITRESHENIYA-AS IT Resheniya LLC, RU | **149833.21** | 2094 | 10 | 22 | 1 |
| 140803 HQDATA-AS-VN 8, Vietnam | **12625.96** | 1941 | 54 | 0 | 11 |
| 59692 IQWEB IQWeb FZ-LLC, AE | **1511.18** | 38670 | 360 | 6616 | 1831 |
| 216234 yy-as Komkov Vadim Aleksandrovich, RU | **1494.56** | 1483 | 56 | 21 | 71 |
| **41564** Orion Network Limited (GB) | **862.36** | 6496 | 1962 | 20 | 539 |
| 48950 GLOBALCOLOCATION GLOBAL COLOCATION LIMITED, GB | **732.60** | 2232 | 508 | 4 | 218 |
| **58065** PacketExchange Packet Exchange Limited (GB) | **688.03** | 9731 | 2874 | 117 | 1012 |
| 46805 AS-46805 Angelnet Limited, SC | **366.05** | 1105 | 159 | 1 | 216 |
| 9002 RETN-AS RETN Limited, GB | **320.83** | 1103 | 942 | 12 | 246 |

## IP ASNs

**We were as surprised as you to see that score of infinity, so we decided to do an extra step for IP ASNs for phishing:** we ran a longitudinal analysis looking back at a 110-day period from December of 2023 to March of 2024. This changed the Top Ten list mildly, though as you can see, most of the same entities appear in both tables, and we still see some extreme signal strengths. Shaded AS names are those appearing in both the snapshot and the 110-day study. *NOTE: because this is a longitudinal data set, the domain counts are averages rounded to the nearest whole number.*

There are a couple of things that we find noteworthy:

- **Higher overall signal strengths** across the 110-day table than the snapshot (discounting the infinity oddity in the snapshot). Intuitively, one might expect signal strengths to be milder in a larger data sample, but that's not the case here. These ASNs truly are ones for defenders to watch out for.
- We see a lot of **consistency in the countries represented**. For example, Flynet and PROSPERO-AS, which didn't appear in the snapshot but do appear in the longitudinal, are both Russian. That said, there is one country in the longitudinal data that don't appear in the snapshot: Singapore (GREYWOLFNETWORKS).

| 110-Day Average Dec ‘23 - Mar ‘24 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---|---|---|---|---|
| 49943 ITRESHENIYA-AS IT Resheniya LLC, RU | **144987.44** | 2490 | 23 | 71 | 2 |
| 140803 HQDATA-AS-VN 8, Vietnam | **32219.16** | 3030 | 39 | 0 | 8 |
| 151609 GREYWOLFNETWORKS-AS-AP GREYWOLF NETWORKS PTE. LTD., SG | **22483.64** | 1274 | 0 | 39 | 4 |
| 198953 Proton66 OOO, RU | **13584.80** | 1662 | 13 | 87 | 3 |
| 51724 FLYNET-AS Flynet Ltd, RU | **6590.75** | 1027 | 34 | 203 | 11 |
| 200593 PROSPERO-AS PROSPERO OOO, RU | **3512.70** | 2046 | 74 | 311 | 345 |
| 216234 yy-as Komkov Vadim Aleksandrovich, RU | **1439.56** | 1403 | 60 | 21 | 72 |
| 59692 IQWEB IQWeb FZ-LLC, AE | **1080.25** | 25909 | 454 | 10991 | 1846 |
| 48950 GLOBALCOLOCATION GLOBAL COLOCATION LIMITED, GB | **744.53** | 2172 | 694 | 3 | 264 |
| 41564 Orion Network Limited (GB) | **741.91** | 6006 | 2519 | 13 | 651 |

**As a side note, we will consider whether it might be helpful to run an entire DomainTools Report in the future on longitudinal data sets such as this one—watch this space!** But now, back to the snapshots.

## IP ASNs

| March 2023 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---|---|---|---|---|
| 133955 WLINCL-AS World-Link International (HK) | **33,632.73** | 1,404 | 599 | 0 | 3 |
| 64270 PACIFICRACK (US) | **3,535.41** | 12,348 | 497 | 3904 | 251 |
| 3214 XTOM xTom GmbH (DE) | **3,408.99** | 17,077 | 36 | 4,270 | 360 |
| 58065 PacketExchange Packet Exchange Limited (GB) | **2,484.73** | 4,149 | 3,596 | 192 | 120 |
| 41564 Orion Network Limited (GB) | **2,277.18** | 3,644 | 3,597 | 84 | 115 |
| 211252 AS_DELIS Delis LLC (US) | **884.86** | 2,598 | 770 | 2846 | 211 |
| **59447 Istanbuldc Veri Merkezi Ltd Sti (TR)** | **302.67** | 2,388 | 485 | 6 | 567 |
| 35913 DEDIPATH-LLC (US) | **116.32** | 17,683 | 307 | 4674 | 10,925 |
| 46573 LAYER-HOST (US) | **115.10** | 17,216 | 417 | 5991 | 10,749 |
| 31624 VFMNL-AS Yoursafe Holding B.V. (NL) | **111.81** | 105,458 | 29,704 | 2405 | 67,785 |

## Malware

As noted above, ASNs 41564 and 58065 also appear on the phishing Top Ten list, but the other notable thing about these two is that they appear in the same rankings as last year—#1 and #2 respectively. Having said that, it's worth noting that the signal strengths are considerably lower this time around. This list had substantial turnover, with four ASNs repeating from March 2023. The overall counts of domains were also a bit lower this time around.

ASNs 7979, 51852, and 33387 were in this malware list and the name server ASN malware Top Ten list, a bit later in the report.

## IP ASNs

| March 2024 | Signal Strength | Malware | Phishing | Spam | Neutral |
|---|---|---|---|---|---|
| **41564*** Orion Network Limited, GB | **230.56** | 1962 | 6496 | 20 | 539 |
| **58065*** PacketExchange Packet Exchange Limited, GB | **179.88** | 2874 | 9731 | 117 | 1012 |
| **7979** SERVERS-COM, US | **133.53** | 7539 | 4439 | 13 | 3576 |
| **39572** ADVANCEDHOSTERS-AS DataWeb Global Group B.V., NL | **54.75** | 7048 | 837 | 1 | 8153 |
| 205056 DHNETWORK DIAHOSTING LIMITED, GB | **45.72** | 1170 | 394 | 0 | 1621 |
| 35908 VPLSNET, US | **13.45** | 4039 | 596 | 61 | 19024 |
| 29873 BIZLAND-SD, US | **6.65** | 30056 | 1984 | 97 | 286163 |
| 51852 PLI-AS Private Layer INC, PA | **6.63** | 1521 | 742 | 103 | 14531 |
| 147008 DIANJIANG-AS-AP Shenzhen Dianjiang Technology Co Ltd, CN | **4.91** | 1355 | 614 | 43 | 17493 |
| 33387 NOCIX, US | **4.86** | 5705 | 1326 | 521 | 74414 |

| March 2023 | Signal Strength | Malware | Phishing | Spam | Neutral |
|---|---|---|---|---|---|
| 41564 Orion Network Limited, GB | **3,769.73** | 3,597 | 3,644 | 84 | 115 |
| 58065 PacketExchange Packet Exchange Limited, GB | **3,611.66** | 3,596 | 4,149 | 192 | 120 |
| 61969 TEAMINTERNET-AS Team Internet AG, DE | **198.08** | 29,821 | 1459 | 84 | 18,145 |
| 7979 SERVERS-COM, US | **176.86** | 3,601 | 467 | 96 | 2,454 |
| 207713 GIR-AS GLOBAL INTERNET SOLUTIONS LLC, RU | **160.60** | 2,901 | 807 | 87 | 2,177 |
| 31624 VFMNL-AS Yoursafe Holding B.V., NL | **52.81** | 29,704 | 105,458 | 2405 | 67,785 |
| 39572 ADVANCEDHOSTERS-AS DataWeb Global Group B.V., NL | **46.32** | 3,166 | 325 | 14 | 8,237 |
| 60592 GRANSY Gransy s.r.o., CZ | **29.74** | 2,639 | 2036 | 46 | 10,695 |
| 58061 SCALAXY-AS Scalaxy B.V., NL | **23.44** | 3,167 | 1455 | 277 | 16,283 |
| 206834 TEAMINTERNET-CA-AS Team Internet AG, DE | **19.86** | 42,021 | 2541 | 149 | 255,014 |

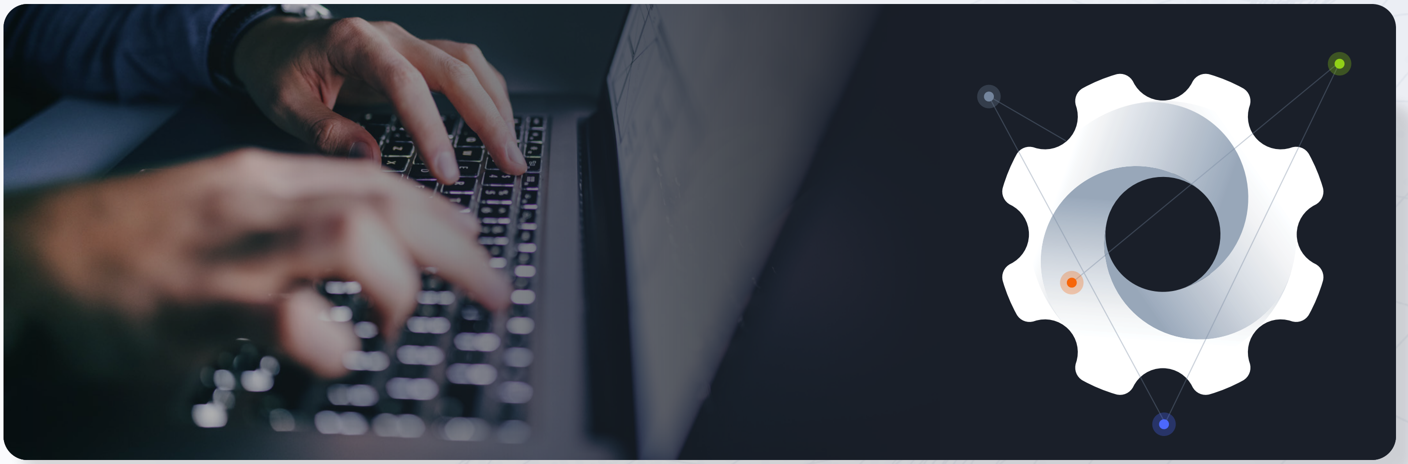
## Spam

While the signal strengths among the first two rows of the spam Top Ten list are not as astronomical as those in the phishing list, they are nothing to sneeze at, coming in at 65,535.49 for 56291, ACE-AS-AP Ace Inc.; and 31,159.78 for 24295, AS-PNAPOSK Unitas Global Co., Ltd., both of Japan. Below these two the signal strengths are substantially milder, but still high relative to some of the other Top Ten lists in this report. If we discount the first two ASNs as outliers, the signal strengths of this list are in roughly the same ballpark as in 2023. There were some ASNs that appear in other Top Ten lists; 59692, IQWEB IQWeb FZ-LLC of the United Arab Emirates, is in the phishing list, and 59796, STORMWALL-AS StormWall s.r.o. of Slovakia, and 137951, ASLINE-AS-AP ASLINE LIMITED of Hong Kong, are in the name server ASN spam list. Turnover was high in this list, with just 4686, BEKKOAME BEKKOAME INTERNET INC. of Japan repeating from March of 2023.

| March 2024 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---|---|---|---|---|
| 56291 ACE-AS-AP Ace, Inc., JP | **65535.49** | 1993 | 75 | 18 | 4 |
| 24295 AS-PNAPOSK Unitas Global Co., Ltd., JP | **31159.78** | 2369 | 13 | 208 | 10 |
| 132827 GATEWAY-AS-AP GATEWAY INC, JP | **1104.32** | 1209 | 5 | 15 | 144 |
| **4686** BEKKOAME BEKKOAME INTERNET INC., JP | **945.12** | 7746 | 17 | 296 | 1078 |
| 18068 ACROSS Dream Wave Shizuoka Co. Ltd., JP | **934.69** | 1606 | 8 | 91 | 226 |
| 59796 STORMWALL-AS StormWall s.r.o., SK | **892.07** | 1526 | 1 | 7 | 225 |
| 59692 IQWEB IQWeb FZ-LLC, AE | **475.27** | 6616 | 38670 | 360 | 1831 |
| 137951 ASLINE-AS-AP ASLINE LIMITED, HK | **415.07** | 104333 | 9486 | 2348 | 33062 |
| 52284 Panamaserver.com, PA | **288.22** | 1558 | 137 | 73 | 711 |
| 400506 BAIAS, US | **203.73** | 1473 | 103 | 542 | 951 |

## IP ASNs

| March 2023 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---|---|---|---|---|
| 64270 PACIFICRACK, US | 4,095.00 | 3,904 | 12,348 | 497 | 251 |
| 211252 AS_DELIS Delis LLC, US | 3,551.16 | 2,846 | 2,598 | 770 | 211 |
| 3214 XTOM xTom GmbH (DE) | 3,122.80 | 4,270 | 17,077 | 36 | 360 |
| 399471 AS-SERVERION, US | 1,095.74 | 1,594 | 259 | 130 | 383 |
| 213035 AS-SERVERION Des Capital B.V., NL | 890.44 | 3,328 | 203 | 156 | 984 |
| 4686 BEKKOAME BEKKOAME INTERNET INC., JP | 728.30 | 3,574 | 82 | 13 | 1,292 |
| 399629 BLNWX, US | 508.52 | 1,099 | 526 | 236 | 569 |
| 46573 LAYER-HOST, US | 146.74 | 5,991 | 17,216 | 417 | 10,749 |
| 17941 BIT-ISLE Equinix Japan Enterprise K.K., JP | 120.75 | 2,294 | 2 | 6 | 5,002 |
| 35913 DEDIPATH-LLC, US | 112.64 | 4,674 | 17,683 | 307 | 10,925 |



# Name Server ASNs

At a glance, these will look similar to the previous category, but in this case, we're looking at the Autonomous System associated with the **name server IPs** for the domains, rather than the hosting IPs. Sometimes registrants use name servers from the same providers they use for hosting, but there's not a direct correspondence. Any domain registrant, legitimate or evil, may have their own preferences for name servers.

As an interesting note, the eagle-eyed reader may observe that in some of the data rows, the counts of domains in different ASNs are identical. These may look like data errors, but in fact, the explanation is that there are some domains for which two or more name servers are assigned, and these name servers have different ASNs. Some analysts may have observed this pattern in individual domains in Iris Investigate or other investigation tools.

## Phishing

This Top Ten list features 100% turnover—none of the top ten name server ASNs is seen in the March 2023 list. Here again, we also see some entities that take their malicious infrastructure seriously, with a total of only 42 neutral domains in the first two rows (vs around 9,500 phishing domains).

| March 2024 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---|---|---|---|---|
| 39845 LV-2CLOUD-ASN16 2 Cloud Ltd., LV | **13991.89** | 8301 | 6 | 8 | 32 |
| 216246 RU-AEZA-AS Aeza Group Ltd., RU | **6882.51** | 1276 | 34 | 11 | 10 |
| 57043 HOSTKEY-AS HOSTKEY B.V., NL | **1645.91** | 8300 | 2 | 2 | 272 |
| 210644 AEZA-AS AEZA INTERNATIONAL LTD, GB | **683.22** | 1292 | 40 | 13 | 102 |
| 55967 BAIDU Beijing Baidu Netcom Science and Technology Co., Ltd., CN | **208.53** | 3553 | 242 | 41 | 919 |
| 40824 WZ-US-40824, US | **189.98** | 9221 | 148 | 47 | 2618 |
| 200019 AlexHost ALEXHOST SRL, MD | **173.37** | 1305 | 35 | 94 | 406 |
| 50867 HOSTKEY-RU-AS HOSTKEY B.V., NL | **144.23** | 8471 | 24 | 3 | 3168 |
| 7979 SERVERS-COM, US | **134.07** | 10000 | 6510 | 45 | 4023 |
| 50613 ThorDC-AS Advania Island ehf, IS | **75.43** | 2053 | 61 | 22 | 1468 |

## Name Server ASNs

| March 2023 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---|---|---|---|---|
| 54990 AS-1337 (KN) | **32.32** | 1,916 | 944 | 119 | 5,135 |
| 39287 Abstract ab stract [sic] (FI) | **31.06** | 1,916 | 944 | 119 | 5,343 |
| 45102 ALIBABA-CN-NET Alibaba US Technology Co., Ltd. (CN) | **20.55** | 12,274 | 7,415 | 1795 | 51,734 |
| 60592 GRANSY Gransy s.r.o. (CZ) | **16.92** | 2,132 | 2,651 | 2132 | 10,916 |
| 51167 CONTABO Contabo GmbH (DE) | **9.68** | 18,553 | 760 | 4416 | 166,062 |
| 19318 IS-AS-1 (US) | **6.84** | 18,101 | 467 | 4345 | 229,141 |
| 131392 RUNSYSTEM-AS-VN GMO-Z.com Runsystem Joint Stock Company (VN) | **5.52** | 3,390 | 551 | 46 | 53,212 |
| 22612 NAMECHEAP-NET (US) | **5.19** | 3,035 | 1069 | 500 | 50,630 |
| 48357 K4X K4X OU (EE) | **5.15** | 1,765 | 556 | 345 | 29,707 |
| 397213 SECURITYSERVICES (US) | **4.38** | 53,175 | 24860 | 21622 | 1,050,967 |

### Name server ASNs

## Malware

While the malware Top Ten list has milder signal strengths than several of the other lists in this report, there is also a significant range, from 108.97 on the top row to 3.63 on the bottom. This means some of these name server ASNs are not particularly strong indicators that a given domain is malicious. As we are of course fond of saying, context is everything; other aspects of a given domain may make it quite suspicious in the eyes of the analyst.

Other things to note:

- This list had 4 repeaters, and ASNs 58519 and 55990 are next to each other again - but further down the list than last year.
- Relative to the last few Top Ten lists in the report, this one features higher numbers of neutral domains
- “Domain names registrar REG.RU”, Ltd, RU has two separate ASNs in this list

| March 2024 | Signal Strength | Malware | Phishing | Spam | Neutral |
|---|---|---|---|---|---|
| **7979 SERVERS-COM (US)** | **108.97** | 6510 | 10000 | 45 | 4023 |
| 51852 PLI-AS Private Layer INC, PA | **5.69** | 6446 | 1507 | 13 | 76328 |
| 33387 NOCIX, US | **5.55** | 6505 | 1406 | 50 | 78950 |
| 30633 LEASEWEB-USA-WDC, US | **4.43** | 8013 | 2642 | 164 | 121823 |
| **58519 CHINATELECOM-CTCLOUD Cloud Computing Corporation (CN)** | **4.19** | 2935 | 4386 | 77 | 47193 |
| **55990 HWCSNET Huawei Cloud Service data center (CN)** | **4.15** | 2935 | 4387 | 77 | 47587 |
| **136907 HWCLOUDS-AS-AP HUAWEI CLOUDS (HK)** | **3.97** | 2987 | 4424 | 164 | 50672 |
| 198610 BEGET-AS Beget LLC, RU | **3.81** | 10548 | 3708 | 38 | 186274 |
| 39561 AS-REGRU "Domain names registrar REG.RU", Ltd, RU | **3.78** | 22542 | 4787 | 395 | 401161 |
| 197695 AS-REGRU "Domain names registrar REG.RU", Ltd, RU | **3.63** | 22727 | 4877 | 405 | 421552 |

## Name Server ASNs

| March 2023 | Signal Strength | Malware | Phishing | Spam | Neutral |
|---|---|---|---|---|---|
| 60592 GRANSY Gransy s.r.o. (CZ) | **34.68** | 2,651 | 2132 | 66 | 10,916 |
| 58519 CHINATELECOM-CTCLOUD Cloud Computing Corporation (CN) | **29.96** | 2,328 | 304 | 15 | 11,098 |
| 55990 HWCSNET Huawei Cloud Service data center (CN) | **28.91** | 2,329 | 304 | 15 | 11,507 |
| 7979 SERVERS-COM (US) | **28.71** | 2,804 | 325 | 31 | 13,948 |
| 136907 HWCLOUDS-AS-AP HUAWEI CLOUDS (HK) | **26.85** | 2,355 | 338 | 15 | 12,525 |
| 45102 ALIBABA-CN-NET Alibaba US Technology Co., Ltd. (CN) | **20.47** | 7,415 | 12274 | 1795 | 51,734 |
| 207021 RCODEZERO-ANYCAST-SEC2 ipcom GmbH (AT) | **11.04** | 29,831 | 2297 | 305 | 385,794 |
| 133618 TRELLIAN-AS-AP Trellian Pty. Limited (AU) | **10.78** | 12,621 | 3380 | 164 | 167,274 |
| 1921 NICAT ipcom GmbH (AT) | **8.87** | 29,885 | 2338 | 305 | 480,957 |
| 46475 LIMESTONENETWORKS (US) | **7.99** | 5,392 | 1807 | 167 | 96,343 |

## Spam

The spam Top Ten list had high turnover, with only one ASN, 4686 (BEKKOAME BEKKOAME INTERNET INC of Japan) repeating (and in the same rank as last year). This list also sees a return to incredibly high signal strengths, showing once again that certain providers are truly dedicated to supporting malicious infrastructure. Even if we discount the first few rows, the signal strengths are higher than in last year's list. Finally, this is the list in which the assignment of name servers in separate ASNs really stands out, with rows 3, 4, and 5 having nearly identical counts of domains.

## Name Server ASNs

| March 2024 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---|---|---|---|---|
| 212913 TIMEHOST-AS FOP Hornostay Mykhaylo Ivanovych, UA | 222820.58 | 4836 | 156 | 16 | 2 |
| 209375 Euroweb-DE SC ITNS.NET SRL, MD | 214711.31 | 4660 | 4 | 7 | 2 |
| 140224 SGPL-AS-AP STARCLOUD GLOBAL PTE., LTD., SG | 13996.68 | 1367 | 14 | 33 | 9 |
| 132585 SIA-HK-AS SkyExchange Internet Access, HK | 12597.01 | 1367 | 14 | 32 | 10 |
| 137951 ASLINE-AS-AP ASLINE LIMITED, HK | 4665.56 | 1367 | 14 | 32 | 27 |
| 59796 STORMWALL-AS StormWall s.r.o., SK | 702.37 | 1593 | 4 | 14 | 209 |
| **4686** BEKKOAME BEKKOAME INTERNET INC. (JP) | 355.50 | 6215 | 3 | 22 | 1611 |
| 56655 TERRAHOST TerraHost AS, NO | 259.45 | 4105 | 24 | 15 | 1458 |
| 140227 HKCICL-AS-AP Hong Kong Communications International Co., Limited, HK | 68.53 | 3234 | 797 | 214 | 4349 |
| 209242 CLOUDFLARESPECTRUM Cloudflare London, LLC, US | 58.08 | 1401 | 26 | 49 | 2223 |

| March 2023 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---|---|---|---|---|
| **4686 BEKKOAME BEKKOAME INTERNET INC. (JP)** | 1473.11 | 4,207 | 69 | 15 | 1003 |
| 7684 SAKURA-A SAKURA Internet Inc. (JP) | 107.28 | 5,935 | 10 | 393 | 19430 |
| 45102 ALIBABA-CN-NET Alibaba US Technology Co., Ltd. (CN) | 12.19 | 1,795 | 12274 | 7415 | 51734 |
| 9370 SAKURA-B SAKURA Internet Inc. (JP) | 11.40 | 5,280 | 141 | 181 | 162714 |
| 51167 CONTABO Contabo GmbH (DE) | 9.34 | 4,416 | 18553 | 760 | 166062 |
| 38283 CHINANET-SCIDC-AS-AP CHINANET SiChuan Telecom Internet Data Center (CN) | 7.55 | 2,093 | 3572 | 2043 | 97395 |
| 397213 SECURITYSERVICES (US) | 7.23 | 21,622 | 53175 | 24860 | 1050967 |
| 19318 IS-AS-1 (US) | 6.66 | 4,345 | 18101 | 467 | 229141 |
| 397220 SECURITYSERVICES (US) | 6.34 | 21,625 | 53452 | 24959 | 1198951 |
| 134543 UNICOM-DONGGUAN-IDC China Unicom Guangdong IP network (CN) | 6.25 | 5,628 | 11868 | 7860 | 316436 |

# IP Geolocation

This category examines hotspots of malicious activity by the country code of the IP address hosting the domains in question. As we have noted in previous editions, the IP hosting region is not generally a strong indicator of maliciousness, as illustrated by the presence of mild malicious signal strengths and even in a couple of cases, slightly better-than-average (less malicious) entries.

## Phishing

The phishing Top Ten list features 4 repeaters, 2 of which are double-repeaters (they appeared in the last two reports). Belize came on strong this year, with both signal strength and domain counts substantially higher than the second-place country (Moldova). Belize, Russia, and Ukraine also figure on this year's spam list, while Taiwan is on this and the malware list. Hong Kong and Singapore, meanwhile, are on all three Top Ten lists.

| March 2024 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---:|---:|---:|---:|---:|
| BZ (Belize) | **495.92** | 38299 | 276 | 6177 | 5367 |
| MD (Moldova) | **23.89** | 1751 | 429 | 350 | 5093 |
| IS (Iceland) | **13.74** | 1249 | 55 | 49 | 6318 |
| **TW (Taiwan)** | **3.35** | 3354 | 1175 | 2211 | 69517 |
| ***VN (Vietnam)*** | **3.34** | 2532 | 810 | 458 | 52627 |
| ***HK (Hong Kong)*** | **3.29** | 16049 | 11594 | 13960 | 338625 |
| SG (Singapore) | **2.53** | 8453 | 8937 | 2286 | 232503 |
| **RU (Russia)** | **2.39** | 22384 | 26120 | 5214 | 651721 |
| SE (Sweden) | **2.28** | 5226 | 1391 | 412 | 159206 |
| UA (Ukraine) | **1.62** | 2005 | 661 | 1218 | 85846 |

| March 2023 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---:|---:|---:|---:|---:|
| **LU (Luxembourg)** | **10.74** | 6852 | 2507 | 3719 | 45919 |
| **HK (Hong Kong)** | **5.08** | 10210 | 4722 | 5059 | 144766 |
| TW (Taiwan) | **2.48** | 1728 | 746 | 400 | 50079 |
| RU (Russia) | **2.18** | 13862 | 5014 | 3886 | 457399 |
| CN (China) | **2.09** | 3930 | 1643 | 456 | 135266 |
| LT (Lithuania) | **1.58** | 1099 | 844 | 491 | 50105 |
| VN (Vietnam) | **1.54** | 1921 | 475 | 202 | 89824 |
| BR (Brazil) | **1.54** | 7775 | 3870 | 1064 | 364573 |
| NL (Netherlands) | **1.43** | 27907 | 12215 | 6808 | 1408415 |
| US (United States) | **1.23** | 205543 | 109958 | 42041 | 12036790 |

## Malware

The malware Top Ten has less turnover than some of the other lists, with half of the top ten repeating from last year; two of the entries, Hong Kong and China, are double-repeaters. Signal strengths are fairly similar to last time around (and are quite low, reminiscent of what we observed in TLDs).

But perhaps the most notable thing about this list is that we only had 9 countries that positively correlated with spam; Taiwan, in tenth spot, actually has a below-1 signal strength, which means that it correlates more with neutral domains than with spam domains. The domain counts illustrate this.

| March 2024 | Signal Strength | Malware | Phishing | Spam | Neutral |
|---|---|---|---|---|---|
| **BR (Brazil)** | 2.37 | 17301 | 9342 | 1948 | 413050 |
| LT (Lithuania) | 2.30 | 9803 | 4837 | 713 | 240268 |
| **RU (Russia)** | 2.26 | 26120 | 22384 | 5214 | 651721 |
| SG (Singapore) | 2.17 | 8937 | 8453 | 2286 | 232503 |
| **HK (Hong Kong)** | 1.93 | 11594 | 16049 | 13960 | 338625 |
| IN (India) | 1.53 | 5239 | 2116 | 2312 | 193809 |
| CH (Switzerland) | 1.50 | 5849 | 1924 | 1682 | 220274 |
| **US (United States)** | 1.30 | 372108 | 255738 | 71200 | 16142004 |
| ***CN (China)*** | 1.28 | 3325 | 1933 | 576 | 146546 |
| TW (Taiwan) | 0.95 | 1175 | 3354 | 2211 | 69517 |

| March 2023 | Signal Strength | Malware | Phishing | Spam | Neutral |
|---|---|---|---|---|---|
| CA (Canada) | 7.41 | 40315 | 5056 | 610 | 655830 |
| **LU (Luxembourg)** | 6.58 | 2507 | 6852 | 3719 | 45919 |
| **HK (Hong Kong)** | 3.93 | 4722 | 10210 | 5059 | 144766 |
| AU (Australia) | 3.18 | 13045 | 4397 | 281 | 494694 |
| **CN (China)** | 1.46 | 1643 | 3930 | 456 | 135266 |
| CZ (Czech Republic) | 1.39 | 4021 | 2365 | 188 | 348230 |
| RU (Russia) | 1.32 | 5014 | 13862 | 3886 | 457399 |
| BR (Brazil) | 1.25 | 3780 | 7775 | 1064 | 364573 |
| US (United States) | 1.10 | 109958 | 205543 | 42041 | 12036790 |
| NL (Netherlands) | 1.05 | 12215 | 27907 | 6808 | 1408415 |

## Spam

The story on this list is actually quite similar to the malware list. There are four countries that repeated from March 2023, and Hong Kong is a double-repeater. Unlike 2023, however, none of the top ten entries has a "green" (more neutral than malicious) signal strength.

Meanwhile, Belize, which had its Top Ten debut in phishing, also tops this list in 2024. What is going on in Belize? (Your authors may need to go there on a fact-finding mission.)

| March 2024 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---:|---:|---:|---:|---:|
| BZ (Belize) | **162.08** | 6177 | 38299 | 276 | 5367 |
| **JP (Japan)** | **9.10** | 15565 | 5103 | 2046 | 240913 |
| **HK (Hong Kong)** | **5.81** | 13960 | 16049 | 11594 | 338625 |
| TW (Taiwan) | **4.48** | 2211 | 3354 | 1175 | 69517 |
| UA (Ukraine) | **2.00** | 1218 | 2005 | 661 | 85846 |
| IN (India) | **1.68** | 2312 | 2116 | 5239 | 193809 |
| **BG (Bulgaria)** | **1.66** | 1320 | 2366 | 588 | 112038 |
| **TR (Turkey)** | **1.55** | 3119 | 2334 | 2474 | 283982 |
| SG (Singapore) | **1.38** | 2286 | 8453 | 8937 | 232503 |
| DE (Germany) | **1.36** | 35373 | 31395 | 32379 | 3659302 |

| March 2023 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---:|---:|---:|---:|---:|
| LU (Luxembourg) | **23.22** | 3719 | 6852 | 2507 | 45919 |
| **HK (Hong Kong)** | **10.02** | 5059 | 10210 | 4722 | 144766 |
| JP (Japan) | **8.82** | 6677 | 993 | 739 | 217153 |
| BG (Bulgaria) | **2.60** | 1128 | 1446 | 377 | 124490 |
| RU (Russia) | **2.44** | 3886 | 13862 | 5014 | 457399 |
| NL (Netherlands) | **1.39** | 6808 | 27907 | 12215 | 1408415 |
| TR (Turkey) | **1.14** | 1454 | 2096 | 1000 | 365450 |
| US (United States) | **1.00** | 42041 | 205543 | 109958 | 12036790 |
| BR (Brazil) | **0.84** | 1064 | 7775 | 3780 | 364573 |
| GB (United Kingdom) | **0.75** | 3422 | 12286 | 5140 | 1316678 |

# Domain Registrars

While the GDPR veiled a considerable amount of the registrant information that can help researchers or defenders cluster domains, those domains still have to be registered somewhere, and the domain registrar is always shown in a Whois record. Therefore, we judge that registrar remains a useful category for searching for signals of malicious activity across the Internet's active domains.

## Phishing

This list features 4 repeaters, with NiceNIC repeating as the top - but check out the signal strength—they seem to have registered only 8 neutral domains! NiceNIC is also a double-feature on this and the Malware lists. Other notable features:

- Alibaba, Sav.com, URL Solutions, and OwnRegistrar are on all 3 Top Ten lists
- URL Solutions, moving from 9th to 2nd place, also seemed to rid itself of neutral domains over the last year
- Alibaba, on the other hand, picked up a lot of neutral domains as well as phishing domains, with a mildly lower signal this year
- Paknic and CNOBIN INFORMATION TECHNOLOGY LIMITED is on this and the malware lists, while Hongkong Kouming International Limited is on this and the Spam lists

| March 2024 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---|---|---|---|---|
| **3765 NICENIC INTERNATIONAL GROUP CO., LIMITED*** | **125050.20** | 26315 | 5608 | 353 | 8 |
| **1449 URL Solutions, Inc.** | **90903.30** | 59779 | 10254 | 7252 | 25 |
| 1367 Paknic (Private) Limited | **99.01** | 2560 | 1193 | 4 | 983 |
| **3775 ALIBABA.COM SINGAPORE E-COMMERCE PRIVATE LIMITED** | **21.15** | 53318 | 14408 | 5535 | 95824 |
| **609 Sav.com, LLC** | **9.46** | 45907 | 31141 | 39464 | 184475 |
| 3972 Hongkong Kouming International Limited | **9.10** | 4591 | 1794 | 1175 | 19175 |
| 817 MAFF Inc. | **8.55** | 1087 | 384 | 86 | 4835 |
| 3858 Aceville Pte. Ltd. | **6.81** | 15304 | 2721 | 473 | 85431 |
| 1250 OwnRegistrar, Inc. | **6.70** | 12693 | 8714 | 4506 | 72026 |
| 3254 CNOBIN INFORMATION TECHNOLOGY LIMITED | **6.56** | 1402 | 1776 | 517 | 8128 |

| March 2023 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---|---|---|---|---|
| 3765 NICENIC INTERNATIONAL GROUP CO., LIMITED | **53.41** | 6769 | 3017 | 544 | 5412 |
| 1915 West263 International Limited | **32.84** | 33850 | 4130 | 261 | 44014 |
| **3775 ALIBABA.COM SINGAPORE E-COMMERCE PRIVATE LIMITED** | **30.78** | 24015 | 8645 | 1502 | 33314 |
| **1868 Eranet International Limited** | **21.24** | 7538 | 1361 | 185 | 15153 |
| 1556 Chengdu West Dimension Digital Technology Co., Ltd. | **15.74** | 40205 | 20642 | 529 | 109094 |
| **3806 Beget LLC** | **13.05** | 2425 | 515 | 28 | 7933 |
| 609 Sav.com, LLC | **10.82** | 37967 | 23273 | 17467 | 149890 |
| **1479 NameSilo, LLC** | **9.64** | 140781 | 29130 | 17196 | 623435 |
| 1449 URL Solutions, Inc. | **9.40** | 8287 | 5110 | 186 | 37637 |
| **1606 Registrar of Domain Names REG.RU LLC** | **9.33** | 17315 | 4778 | 843 | 79285 |

## Malware

NiceNIC has gotten busy - it takes top position in both phishing and malware, and look at those signal strengths—similar to what we've seen in a few of the other lists this year. Like NiceNIC, URL Solutions also seems to have shed neutral domains since last year. Having said this, if we discount the outliers, the bulk of the list actually shows overall lower signal strengths than in March 2023.

There was less turnover in malware, with 6 registrars repeating from last year. Finally, we note that Cloud Yuqu also appears on this year's spam list.

## Domain Registrars

| March 2024 | Signal Strength | Malware | Phishing | Spam | Neutral |
|---|---|---|---|---|---|
| **3765 NICENIC INTERNATIONAL GROUP CO., LIMITED*** | **29335.34** | 5608 | 26315 | 353 | 8 |
| **1449 URL Solutions, Inc.** | **17164.31** | 10254 | 59779 | 7252 | 25 |
| 1367 Paknic (Private) Limited | **50.79** | 1193 | 2560 | 4 | 983 |
| 3254 CNOBIN INFORMATION TECHNOLOGY LIMITED | **9.14** | 1776 | 1402 | 517 | 8128 |
| 3806 Beget LLC | **7.65** | 7019 | 3028 | 69 | 38421 |
| **609 Sav.com, LLC** | **7.06** | 31141 | 45907 | 39464 | 184475 |
| **3775 ALIBABA.COM SINGAPORE E-COMMERCE PRIVATE LIMITED** | **6.29** | 14408 | 53318 | 5535 | 95824 |
| 1606 Registrar of Domain Names REG.RU LLC | **5.83** | 26351 | 15929 | 799 | 189192 |
| **1250 OwnRegistrar, Inc.** | **5.06** | 8714 | 12693 | 4506 | 72026 |
| **3824 Cloud Yuqu LLC** | **4.35** | 4480 | 2791 | 4504 | 43104 |

| March 2023 | Signal Strength | Malware | Phishing | Spam | Neutral |
|---|---|---|---|---|---|
| 3765 NICENIC INTERNATIONAL GROUP CO., LIMITED | **48.21** | 3017 | 6769 | 544 | 5412 |
| 3775 ALIBABA.COM SINGAPORE E-COMMERCE PRIVATE LIMITED | **22.44** | 8645 | 24015 | 1502 | 33314 |
| 3824 Cloud Yuqu LLC | **20.93** | 3297 | 1161 | 28 | 13620 |
| 1556 Chengdu West Dimension Digital Technology Co., Ltd. | **16.36** | 20642 | 40205 | 529 | 109094 |
| 609 Sav.com, LLC | **13.43** | 23273 | 37967 | 17467 | 149890 |
| 1449 URL Solutions, Inc. | **11.74** | 5110 | 8287 | 186 | 37637 |
| 1555 22net, Inc. | **9.57** | 2781 | 1710 | 47 | 25140 |
| 1250 OwnRegistrar, Inc. | **9.10** | 9192 | 9218 | 1043 | 87355 |
| 1915 West263 International Limited | **8.12** | 4130 | 33850 | 261 | 44014 |
| 1868 Eranet International Limited | **7.77** | 1361 | 7538 | 185 | 15153 |

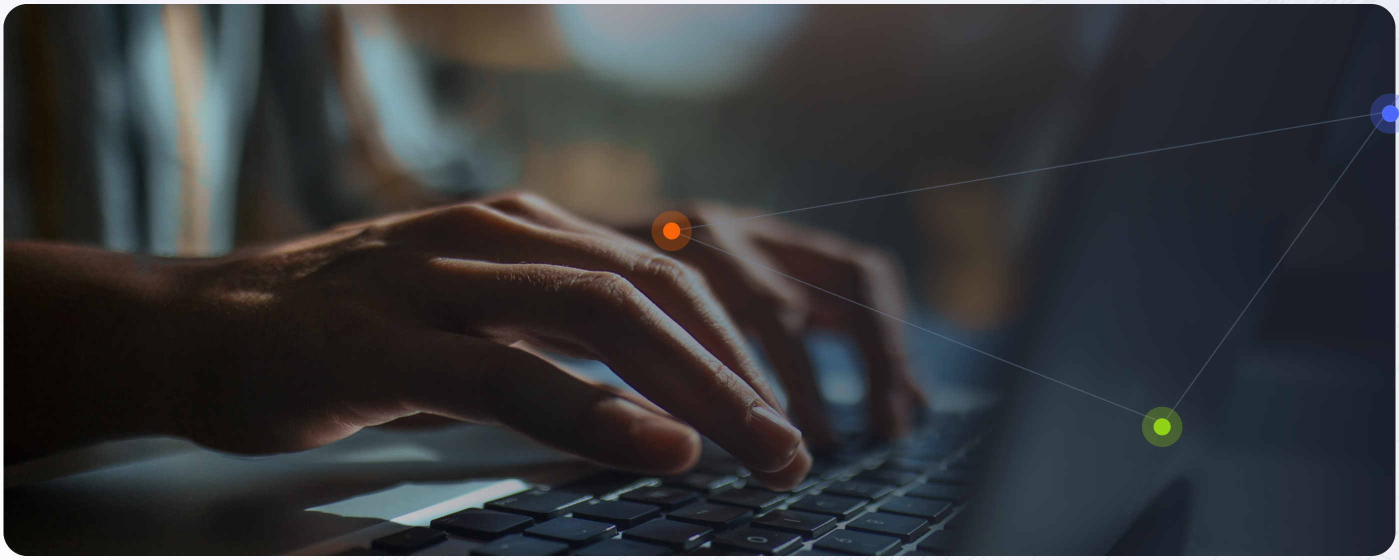
## Spam

URL Solutions "overachieved" (dubious achievement) vs. the other registrars, with a signal strength more than three orders of magnitude higher than the next-place registrar. It and four other registrars were repeaters this year, but none was a double-repeater.

| March 2024 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---|---|---|---|---|
| **1449 URL Solutions Inc** | **17164.31** | 10254 | 59779 | 7252 | 25 |
| **609 Sav.com, LLC** | **7.06** | 31141 | 45907 | 39464 | 184475 |
| **3775 ALIBABA.COM SINGAPORE E-COMMERCE PRIVATE LIMITED** | **6.29** | 14408 | 53318 | 5535 | 95824 |
| **1250 OwnRegistrar, Inc.** | **5.06** | 8714 | 12693 | 4506 | 72026 |
| 3824 Cloud Yuqu LLC | **4.35** | 4480 | 2791 | 4504 | 43104 |
| **1923 Gname.com Pte. Ltd.** | **4.05** | 55114 | 74585 | 35074 | 569645 |
| 3972 Hongkong Kouming International Limited | **3.92** | 1794 | 4591 | 1175 | 19175 |
| 460 Web Commerce Communications Limited dba WebNic.cc | **3.76** | 13328 | 15219 | 4226 | 148524 |
| 1509 Cosmotown, Inc. | **2.95** | 5572 | 5992 | 1085 | 78913 |
| 1601 Atak Domain Bilgi Teknolojileri A.S. | **2.71** | 3992 | 6022 | 1200 | 61657 |

## Domain Registrars

| March 2023 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---|---|---|---|---|
| Sav.com, LLC | **24.34** | 17467 | 37967 | 23273 | 149890 |
| **GMO IntGMO Internet, Inc. d/b/a Onamae.com** | **17.25** | 54529 | 13501 | 6244 | 660360 |
| 3775 ALIBABA.COM SINGAPORE E-COMMERCE PRIVATE LIMITED | **9.42** | 1502 | 24015 | 8645 | 33314 |
| **3855 Hong Kong Juming Network Technology Co., Ltd** | **6.60** | 1740 | 2995 | 1373 | 55097 |
| 1479 NameSilo, LLC | **5.76** | 17196 | 140781 | 29130 | 62,435 |
| 1599 Alibaba Cloud Computing Ltd. d/b/a HiChina (www.net.cn) | **5.43** | 4192 | 16838 | 5873 | 161257 |
| Namecheap, Inc. | **4.52** | 52490 | 124890 | 56528 | 2426272 |
| 1250 OwnRegistrar, Inc. | **2.49** | 1043 | 9218 | 9192 | 87355 |
| Dynadot, LLC | **2.40** | 4601 | 23326 | 24704 | 401274 |
| 1923 Gname.com Pte. Ltd. | **2.27** | 1604 | 14414 | 6190 | 147642 |



# SSL Certificate Authorities

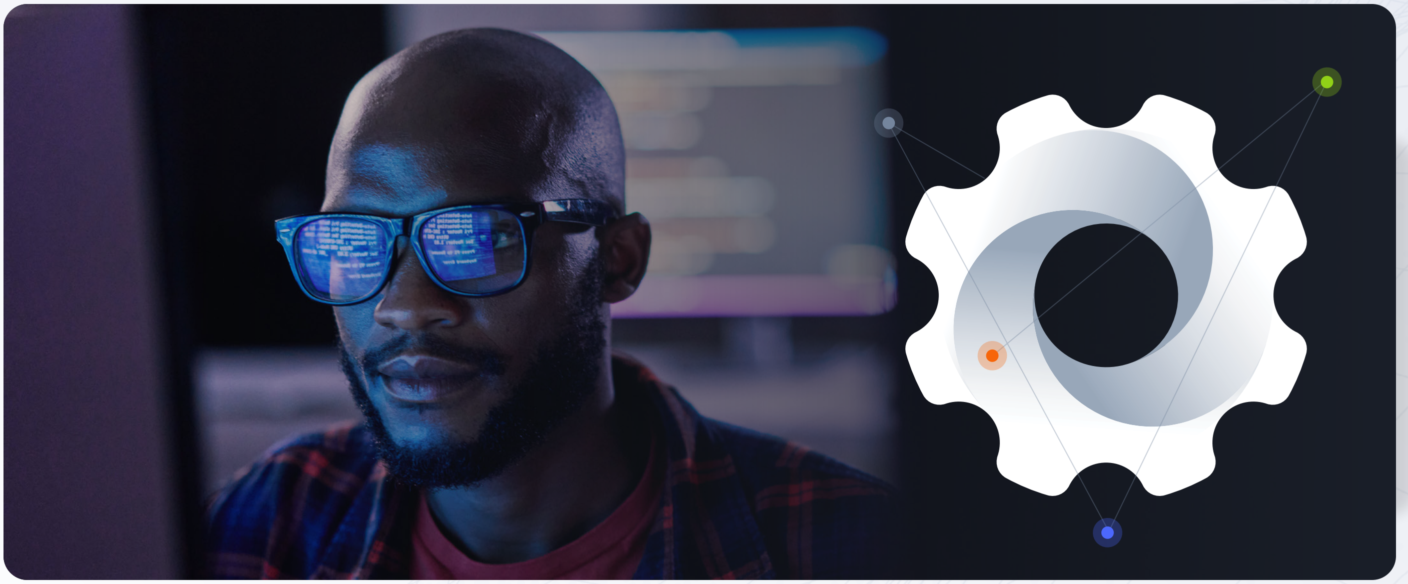
As has been the case previously, with SSL Certificate Authorities (CAs), we have seen threat categories in which **the data did not turn up ten entities that all had signals of maliciousness** in each of the threat types. As a consequence, the tables below include some green cells, as first seen in the Fall 2021 edition. As a reminder, a signal strength of 1.00 is entirely neutral. Almost every data point in the other categories of this report has a signal strength greater than 1.00, indicating that domains sharing that data point have a higher concentration of malicious domains than their lower-signal peers. For the CAs associated with domains, however, fewer than ten had a positive correlation with maliciousness for any of the threat types.

One of the CAs most often pilloried for associations with malicious domains—**Let's Encrypt**—actually had positive signals in every threat type, except in the spam list, where both "flavors" of Let's Encrypt certificates were correlated (albeit very slightly) with malicious domains. What "flavors" do we mean? Each of the Top 10 tables in this section has two entries for Let's Encrypt—one with the CN E1, and one with the CN R3. E1 refers to a certificate type that uses a different cryptographic algorithm. There are not as many of these certificates in circulation as the previously existing R3 type, though it has gained ground in the year-plus that it has been around; but they are associated with enough malicious activity that the **Let's Encrypt E1 certificates took second place in our lists for each threat type, exactly as they did last year**. (It is important to note that this correlation with malicious activity has nothing to do with the certificates themselves. Rather, for reasons unknown, actors who create malicious domains seem to be fans of the newer certificate type, relative to creators of neutral domains.) The more common R3 certificates correlated slightly with more neutral domains, as shown in the previous report.

Some readers may wonder why s**elf-signed certificates make no appearance** in our Top Ten lists. There is a two-part explanation: first, our thresholding eliminates any issuer with fewer than 1,000 domains of the threat type under examination. Second, some of the tunings we did to the inputs to the report (well-regarded domain blocklists) resulted in changes to malicious domain counts. This tuning meant that for this edition of the report (as well as the last report), self-signed certificates were not tied to more than 1000 domains in the phishing or spam categories, though they do appear on the malware list this year.

The spam list also has fewer than ten rows altogether—it's a "Top Seven" list. The reason has to do, again, with our thresholding. There are only seven CAs that have more than 1,000 active spam domains tied to them.

The final point to emphasize for certificate issuers is that we saw more repeaters in these three lists (look for the bold entity names) than in the other categories of both this and the last edition of the report.



## Phishing

Certificate issuers showed less correlation with phishing in our 2024 snapshot than in last year's, illustrated by 6 "green" rows in this table, vs. 4 in 2023. The Google Trust Services 1P5 certificate repeated in the same position at the top, though with a milder signal this time. It's also a double-repeater. The same holds true for the aforementioned E1 Let's Encrypt certificates. Finally, CN=Cloudflare Inc ECC CA-3,O=Cloudflare\, Inc.,C=US moved into the green this time, meaning that these certificates are mildly less correlated with maliciousness than a random sample of domains.

| March 2024 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---|---|---|---|---|
| ***CN=GTS CA 1P5,O=Google Trust Services LLC,C=US**** | 3.66 | 111275 | 206981 | 22322 | 2847881 |
| ***CN=E1,O=Let's Encrypt,C=US**** | 2.81 | 53540 | 100941 | 9043 | 1780074 |
| CN=ZeroSSL ECC Domain Secure Site CA,O=ZeroSSL,C=AT | 2.31 | 2757 | 2902 | 345 | 111558 |
| **CN=ZeroSSL RSA Domain Secure Site CA,O=ZeroSSL,C=AT** | 1.48 | 4342 | 6942 | 1076 | 274895 |
| **CN=Encryption Everywhere DV TLS CA - G2,OU=www.digicert.com,O=DigiCert Inc,C=US** | 0.75 | 8147 | 12143 | 1223 | 1018652 |
| CN=R3,O=Let's Encrypt,C=US | 0.71 | 175432 | 202190 | 76505 | 23100405 |
| CN=GTS CA 1D4,O=Google Trust Services LLC,C=US | 0.62 | 2423 | 2253 | 323 | 366536 |
| **CN=Cloudflare Inc ECC CA-3,O=Cloudflare\, Inc.,C=US** | 0.57 | 4243 | 8307 | 118 | 692033 |
| **CN=Go Daddy Secure Certificate Authority - G2,OU=http://certs.godaddy.com/repository/,O=GoDaddy.com\, Inc.,L=Scottsdale,ST=Arizona,C=US** | 0.54 | 7719 | 10221 | 717 | 1348476 |
| CN=cPanel\, Inc. Certification Authority,O=cPanel\, Inc.,L=Houston,ST=TX,C=US | 0.51 | 7270 | 5737 | 1657 | 1326072 |

## SSL Certificate Authorities

| March 2023 | Signal Strength | Phishing | Malware | Spam | Neutral |
|---|---|---|---|---|---|
| CN=**GTS CA 1P5,O=Google Trust Services LLC,**C=US | **10.95** | 49888 | 23098 | 6630 | 681628 |
| CN=**E1,O=Let's Encrypt,**C=US | **5.06** | 8161 | 5587 | 1521 | 241103 |
| CN=**Cloudflare Inc ECC CA-3**,O=Cloudflare\, Inc.,C=US | **2.84** | 31931 | 17374 | 3504 | 1683623 |
| **CN=Encryption Everywhere DV TLS CA - G2,OU=www.digicert.com,O=DigiCert Inc,C=US** | **2.31** | 1497 | 443 | 79 | 97115 |
| CN=**ZeroSSL RSA Domain Secure Site CA,**O=ZeroSSL,C=AT | **1.91** | 2413 | 1344 | 193 | 189379 |
| CN=**GTS CA 1D4,O=Google Trust Services LLC**,C=US | **1.32** | 2465 | 1534 | 112 | 279858 |
| CN=**cPanel\, Inc. Certification Authority**,O=cPanel\, Inc.,L=Houston,ST=TX,C=US | **0.65** | 11758 | 5763 | 818 | 2708969 |
| **CN=**R3,O=Let's Encrypt**,C=US** | **0.63** | 81563 | 71733 | 18516 | 19520458 |
| CN=**Encryption Everywhere DV TLS CA - G1,**OU=www.digicert.com,O=DigiCert Inc,C=US | **0.57** | 3133 | 1814 | 77 | 821459 |
| CN=Sectigo RSA Domain Validation Secure Server CA,O=Sectigo Limited,L=Salford,ST=Greater Manchester,C=GB | **0.49** | 6708 | 4510 | 235 | 2038567 |

## Malware

This list may be the most similar to its 2023 counterpart than any other table in this report. The malware category shows the same number of green rows as before (four), comparable signal strengths, and a lot of repeating certificate issuers. Self-signed certificates do make an appearance on this list, just barely registering above a random sample, with a signal strength of 1.03.

## SSL Certificate Authorities

| March 2024 | Signal Strength | Malware | Spam | Phishing | Neutral |
|---|---|---|---|---|---|
| **_CN=GTS CA 1P5,O=Google Trust Services LLC,C=US*_** | **4.45** | 206981 | 111275 | 22322 | 2847881 |
| **_CN=E1,O=Let's Encrypt,C=US*_** | **3.47** | 100941 | 53540 | 9043 | 1780074 |
| CN=ZeroSSL ECC Domain Secure Site CA,O=ZeroSSL,C=AT | **1.59** | 2902 | 2757 | 345 | 111558 |
| **CN=ZeroSSL RSA Domain Secure Site CA,O=ZeroSSL,C=AT*** | **1.55** | 6942 | 4342 | 1076 | 274895 |
| self-signed | **1.03** | 4070 | 715 | 191 | 241841 |
| **CN=Sectigo RSA Domain Validation Secure Server CA,O=Sectigo Limited,L=Salford,ST=Greater Manchester,C=GB** | **1.02** | 27085 | 7767 | 1115 | 1619230 |
| **CN=Cloudflare Inc ECC CA-3,O=Cloudflare\, Inc.,C=US** | **0.74** | 8307 | 4243 | 118 | 692033 |
| **CN=Encryption Everywhere DV TLS CA - G2,OU=www.digicert.com,O=DigiCert Inc,C=US** | **0.73** | 12143 | 8147 | 1223 | 1018652 |
| **CN=R3,O=Let's Encrypt,C=US** | **0.54** | 202190 | 175432 | 76505 | 23100405 |
| CN=Go Daddy Secure Certificate Authority - G2, OU=http://certs.godaddy.com/repository/,O=GoDaddy.com\, wInc.,L=Scottsdale,ST=Arizona,C=US | **0.46** | 10221 | 7719 | 717 | 1348476 |

| March 2023 | Signal Strength | Malware | Spam | Phishing | Neutral |
|---|---|---|---|---|---|
| *CN=GTS CA 1P5,O=Google Trust Services LLC,C=US* | **7.58** | 23098 | 6630 | 49888 | 681628 |
| *CN=E1,O=Let's Encrypt,C=US* | **5.18** | 5587 | 1521 | 8161 | 241103 |
| CN=**Cloudflare Inc ECC CA-3**,O=Cloudflare\, Inc.,C=US | **2.31** | 17374 | 3504 | 31931 | 1683623 |
| CN=**ZeroSSL RSA Domain Secure Site CA**,O=ZeroSSL,C=AT | **1.59** | 1344 | 193 | 2413 | 189379 |
| CN=**GTS CA 1D4,O=Google Trust Services LLC**,C=US | **1.23** | 1534 | 112 | 2465 | 279858 |
| CN=**R3,O=Let's Encrypt**,C=US | **0.82** | 71733 | 18516 | 81563 | 19520458 |
| CN=Sectigo RSA Domain Validation Secure Server CA,O=Sectigo Limited,L=Salford,ST=Greater Manchester,C=GB | **0.50** | 4510 | 235 | 6708 | 2038567 |
| CN=Encryption Everywhere DV TLS CA - G1,OU=www.digicert.com,O=DigiCert Inc,C=US | **0.49** | 1814 | 77 | 3133 | 821459 |
| CN=**cPanel\, Inc. Certification Authority**,O=cPanel\, Inc.,L=Houston,ST=TX,C=US | **0.48** | 5763 | 818 | 11758 | 2708969 |

## Spam

The spam list showed a bit more change than did the malware list; it consists of 7 rows this time vs 4 last time. This means that there were more issuers associated with at least 1,000 spam domains than there were on the last report. Signal strengths are overall unremarkable, and are very similar to the other threat categories.

| March 2024 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---|---|---|---|---|
| CN=GTS CA 1P5,O=Google Trust Services LLC,C=US* | 2.47 | 22322 | 111275 | 206981 | 2847881 |
| CN=E1,O=Let's Encrypt,C=US* | 1.60 | 9043 | 53540 | 100941 | 1780074 |
| CN=ZeroSSL RSA Domain Secure Site CA,O=ZeroSSL,C=AT | 1.23 | 1076 | 4342 | 6942 | 274895 |
| CN=R3,O=Let's Encrypt,C=US* | 1.04 | 76505 | 175432 | 202190 | 23100405 |
| **CN=cPanel\, Inc. Certification Authority,O=cPanel\, Inc.,L=Houston,ST=TX,C=US** | 0.39 | 1657 | 7270 | 5737 | 1326072 |
| CN=Encryption Everywhere DV TLS CA - G2,OU=www.digicert.com,O=DigiCert Inc,C=US | 0.38 | 1223 | 8147 | 12143 | 1018652 |
| CN=Sectigo RSA Domain Validation Secure Server CA,O=Sectigo Limited,L=Salford,ST=Greater Manchester,C=GB | 0.22 | 1115 | 7767 | 27085 | 1619230 |

| March 2023 | Signal Strength | Spam | Phishing | Malware | Neutral |
|---|---|---|---|---|---|
| CN=GTS CA 1P5,O=Google Trust Services LLC,C=US | 9.25 | 6,630 | 49888 | 23098 | 681628 |
| CN=E1,O=Let's Encrypt,C=US | 6.00 | 1,521 | 8161 | 5587 | 241103 |
| CN=**Cloudflare Inc ECC CA-3**,O=Cloudflare\, Inc.,C=US | 1.98 | 3,504 | 31931 | 17374 | 1683623 |
| CN=**R3,O=Let's Encrypt**,C=US | 0.90 | 18,516 | 81563 | 71733 | 19520458 |

# Conclusion

Perhaps the most interesting takeaway from this year's report is those extreme signal strengths we observed in several tables, including the "infinite" signal strength for the first-place Russian hosting AS. Some entities on the Internet are almost exclusively devoted to malicious activity. Defenders may have seen these appear on their networks (though we hope not), and these entities show that scrutiny of some of these features of domains can help identify dangerous activity.

We identify these "hotspots" of malicious activity in part to point investigators and researchers toward forensic data points that will be useful in helping make sense of Internet infrastructure of unknown quality or nature. We also use the information to help inform our own research and development efforts, as we seek to develop ever-more-accurate algorithms for predicting the nature of a given domain.  We acknowledge that as forensic indicators, some of these data points are not likely to make too big an impact for most organizations, as the odds of coming across any of the domains tied to them are low. On the other hand, we do consistently observe some data points with meaningful numbers of malicious domains, and in some cases, these come with meaningful signal strengths. Such data points represent clusters of activity where a real impact is being felt by victims.

**We hope that this and future editions will be useful to others who, like the DomainTools team, are passionate about making the Internet a safer place for everyone.**