

IPV6 MATRIX PROJECT

Tracking IPv6 accessible content
Worldwide

<http://www.ipv6matrix.org>

Dr. Tim Chown, Jisc – Tim.Chown@jisc.ac.uk
for Olivier MJ Crépin-Leblond, Internet Society UK (<https://isoc-e.org/>)
18 November 2025

IPV6 MATRIX PROJECT

ISOC England was awarded a Community Grants Programme award in November 2009

Design and implementation of an “IPv6 Crawler,” software on a computer that crawls through the DNS at regular intervals in order to detect and test:

- IPv6 DNS servers
- IPv6 compliant Web servers
- IPv6 compliant SMTP mailers
- IPv6 compliant NTP servers.



PROJECT RATIONALE

Today, more than 95% of Internet traffic is generated by a small number of data sources – i.e. the world's busiest Web Sites

Without IPv6 accessible content, IPv6 has less chance of being used.

Data is sourced by querying the DNS records of the top 1 million domains as rated by Majestic Million. Add more domains later.

Test them for IPv6 connectivity: Web, Mail, Time and Name servers listed in those records.

Further processing: geolocation, ping and path comparison between IPv4 and v6 hosts; comparable reachability of v4 and v6 services.

This is equivalent to testing about 7+ million hosts worldwide



MEASURING IPV6 DEPLOYMENT

Some good examples out there already

- <https://pulse.internetsociety.org/>
- <https://www.google.com/intl/en/ipv6/statistics.html>
- <http://6lab.cisco.com/stats/>
- <https://www.vyncke.org/ipv6status/>
- https://mrp.net/ipv6_survey/
- <https://stats.labs.apnic.net/ipv6>

None of them are exact science



THE IPV6 MATRIX

Initial 'crawler' code was developed by ISOC England in conjunction with Nile University in 2009/10




- Started crawling the domains, with basic display mechanisms

Due to Arab Spring, the crawler moved to Telehouse (2012)

ISOC England – Student-Led Crawler Project (2013/14)

4th-year MEng students at University of Southampton Part of a major Group Design Project (3/8 of final year grade)

Project brief:

-  Improve crawler data presentation
-  Enhance crawler robustness
-  Apply Open Data principles (theodi.org)

Crawler infrastructure relocated to Southampton

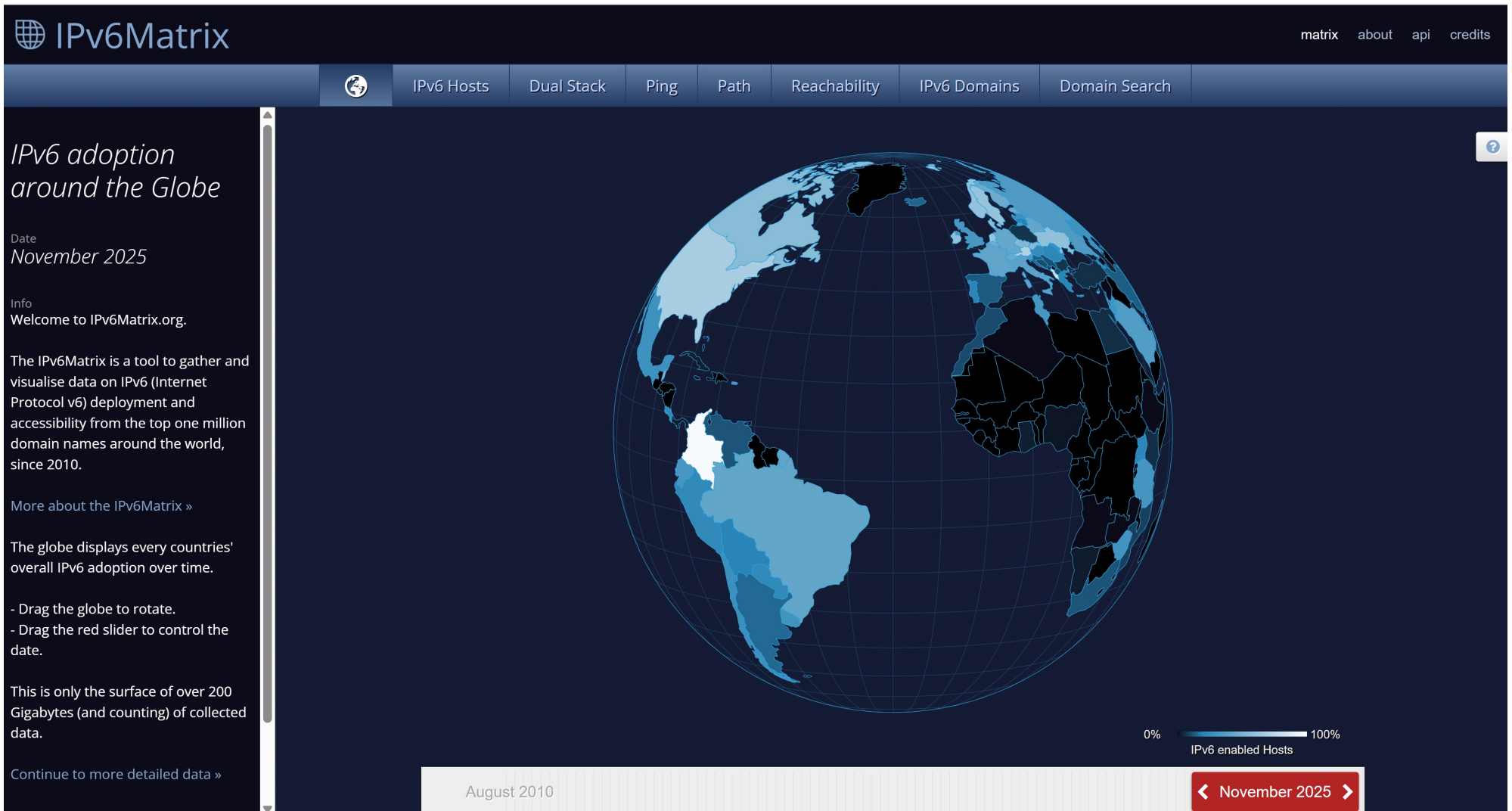
Students had 10 weeks to gather requirements and deliver a working prototype

Module highly regarded by students and industry; ~30 projects run annually

EVOLVING THE IPV6 MATRIX

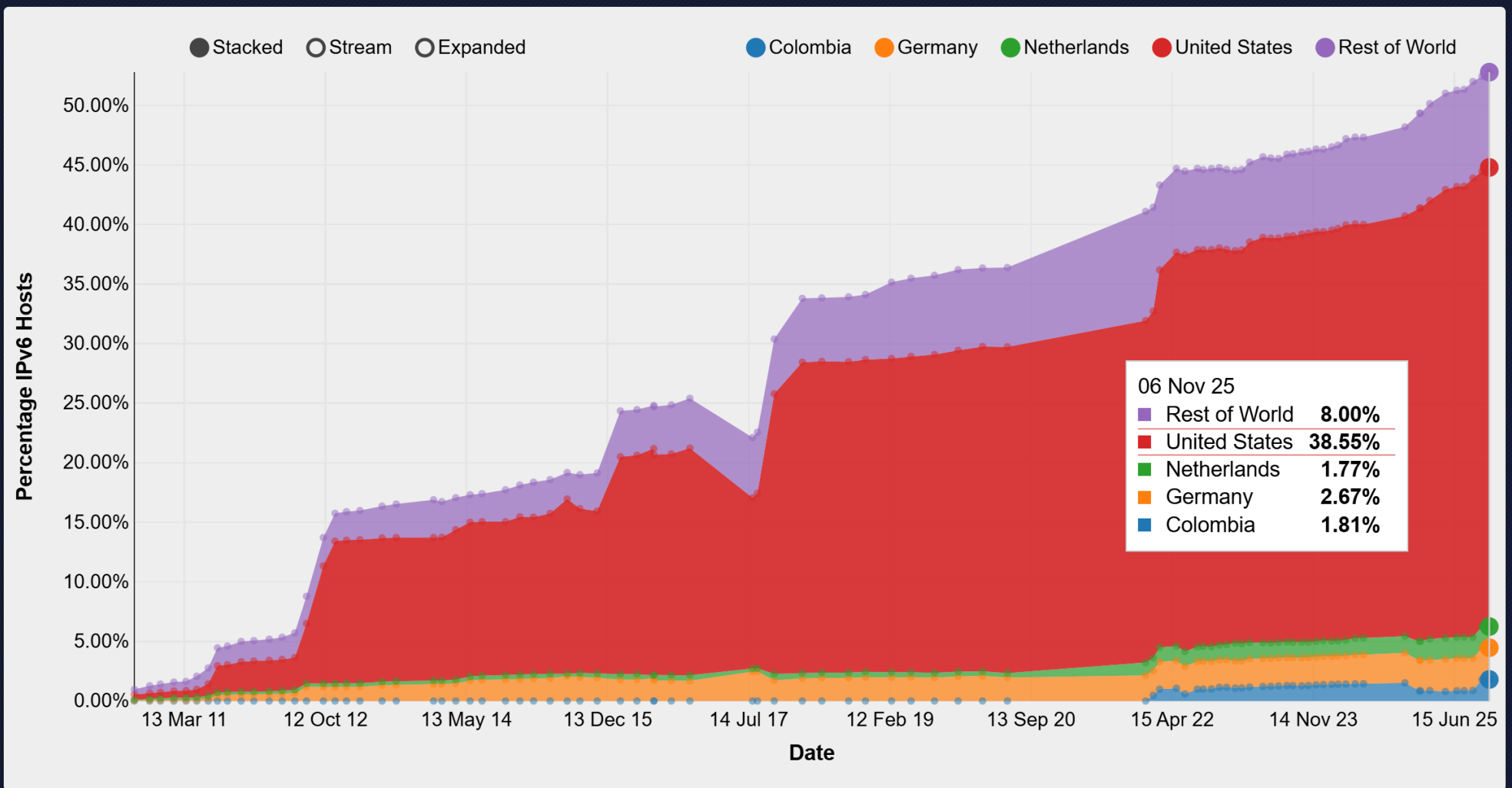
The project was migrated to virtual hosting in 2021

- Uses data since 2010
- New, more efficient Crawler re-written from scratch
- Updated Web interface
- Hosting provided pro-bono by **Mythic Beasts** (thank you!)
- Can export stats in a variety of non-proprietary formats
- See <http://www.ipv6matrix.org>
- Crawls are continuing to run on a monthly basis
- Total database size 750 Gb (November 2025)
- Some results follow...

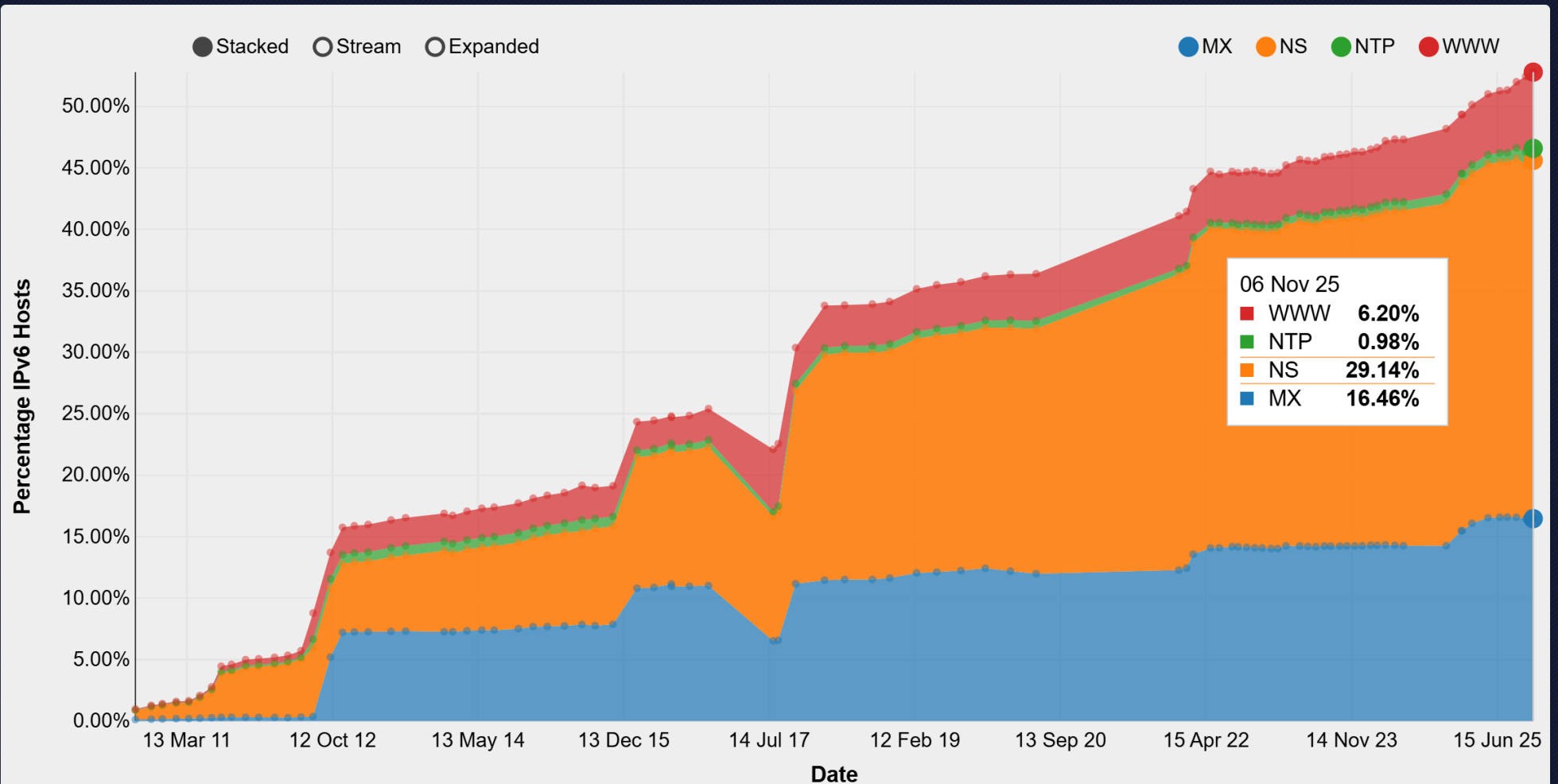




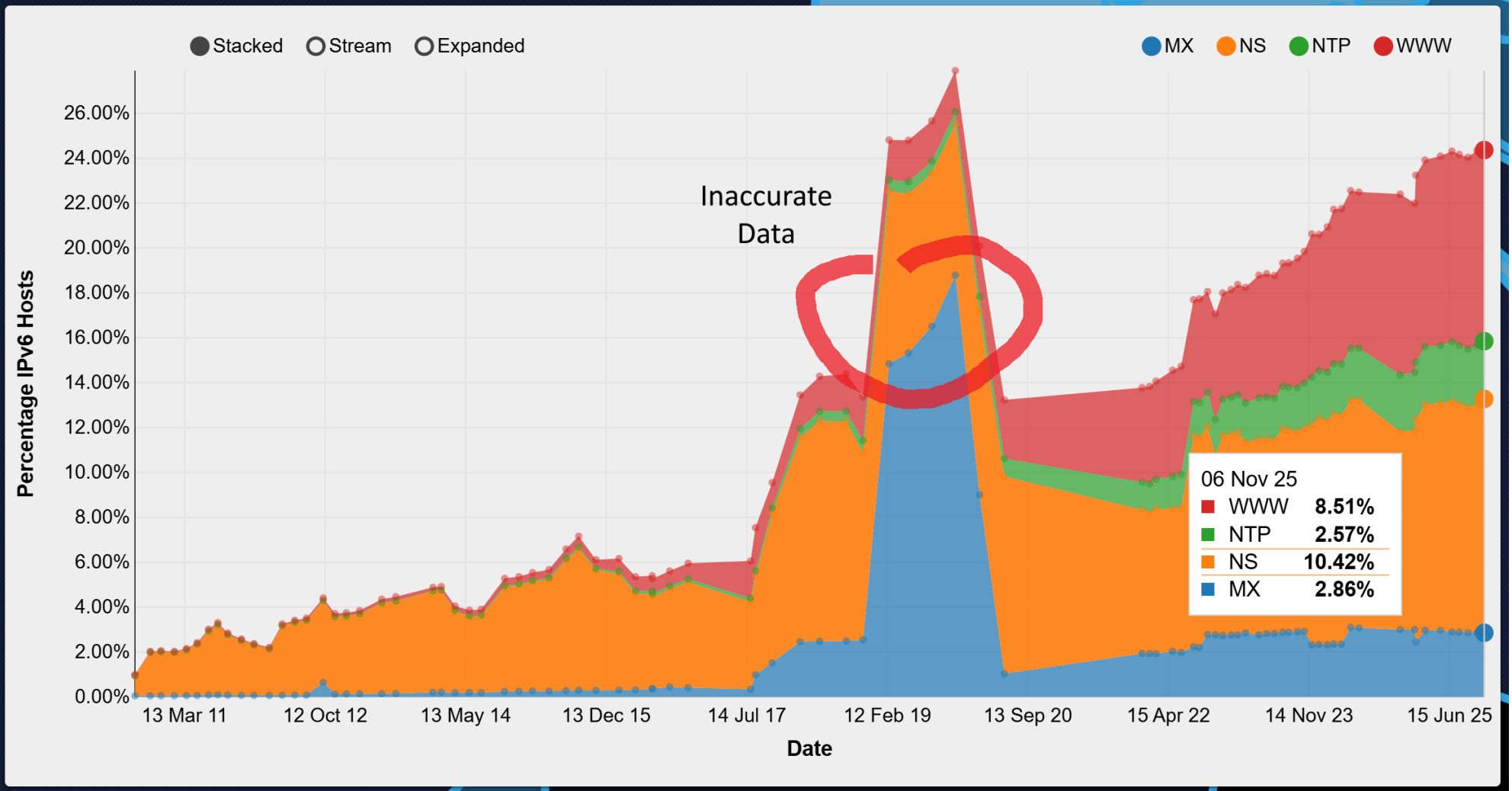
IPv6 Host percentage by Country over time ?



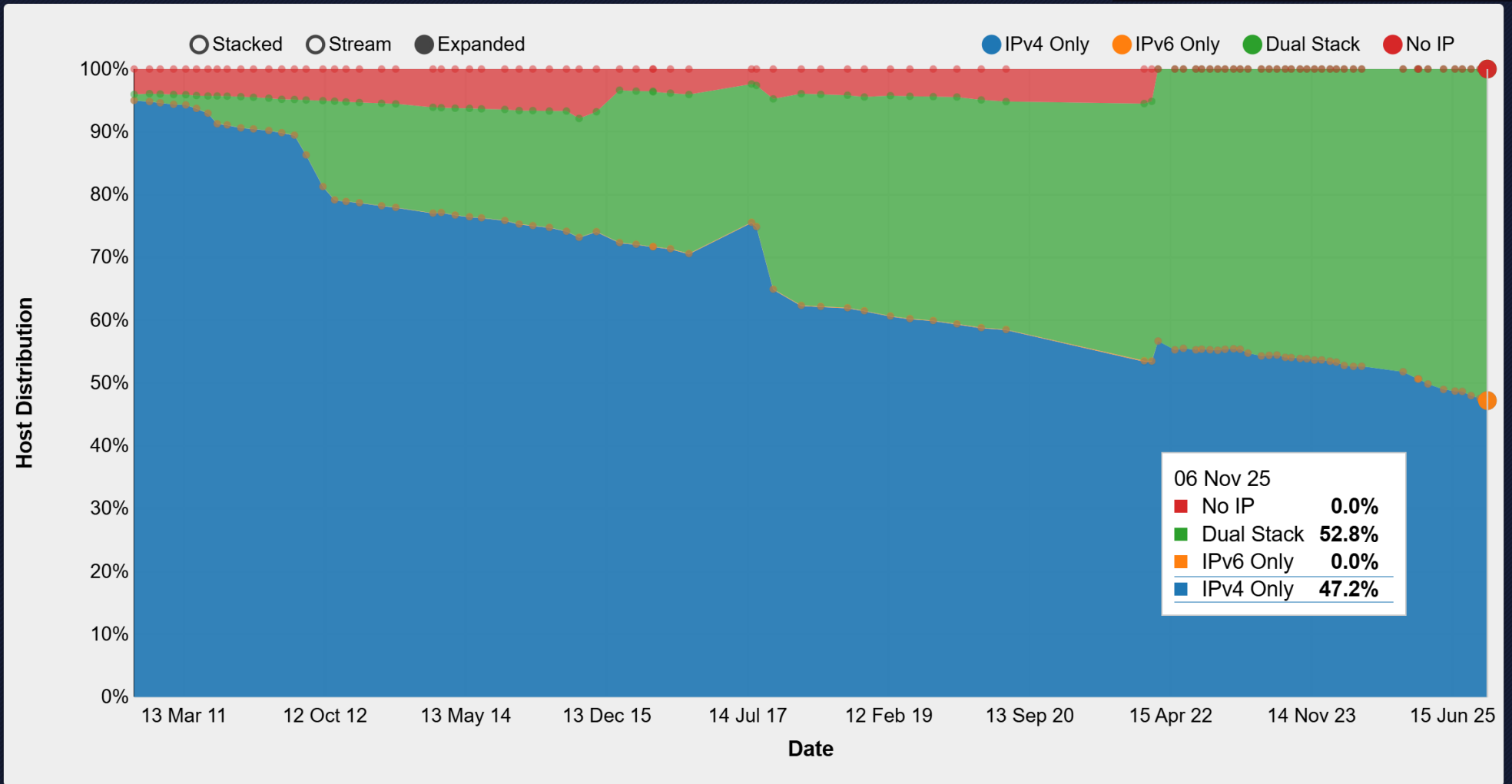
IPv6 Host percentage by Service Type over time ?



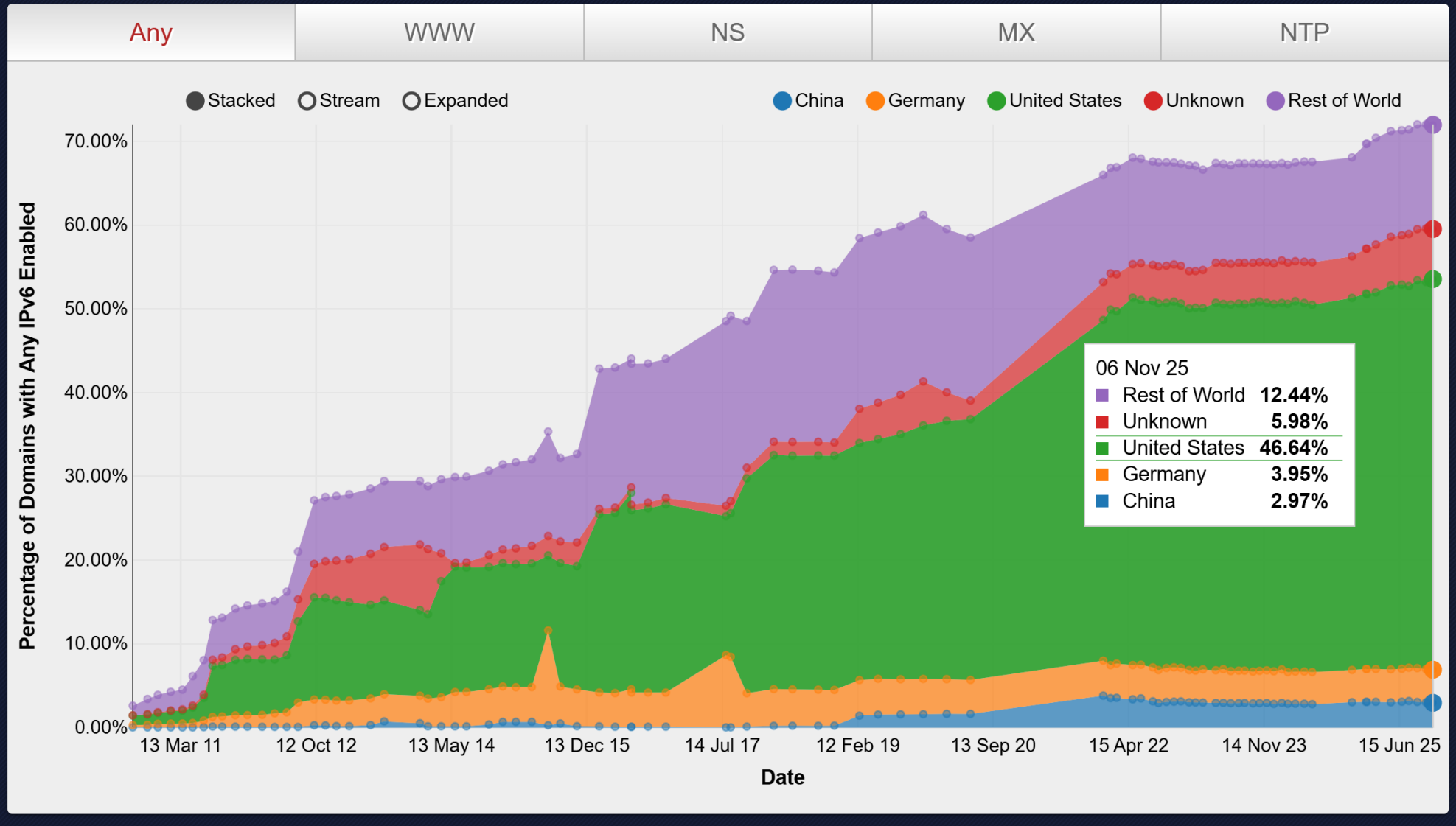
IPv6 Host percentage by Service Type over time ?



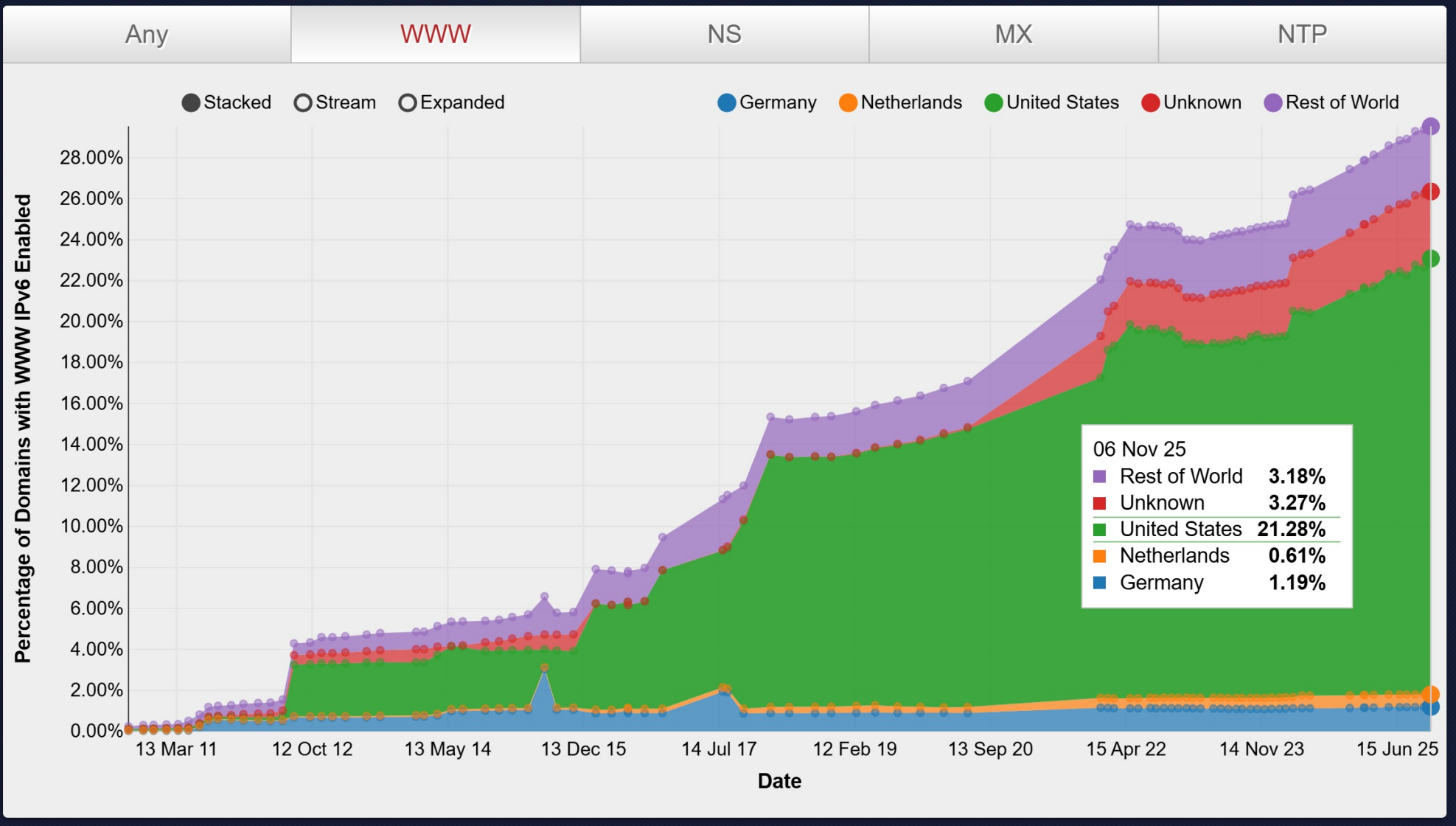
Distribution of Host types over time ?



IPv6 enabled Domains by Country over time ?



IPv6 enabled Domains by Country over time ?



Raw Data file for WWW using comma separated values

WWW,google.co.uk,www.google.co.uk,216.58.213.99,2a00:1450:4009:809::2003
WWW,amazon.co.uk,www.amazon.co.uk,52.85.63.210,n/a
WWW,bbc.co.uk,www.bbc.co.uk,212.58.244.68,n/a
WWW,bbc.co.uk,www6.bbc.co.uk,n/a,2001:4b10:bbc::2
WWW,bbc.co.uk,ipv6.bbc.co.uk,n/a,2001:4b10:bbc::1
WWW,ebay.co.uk,www.ebay.co.uk,92.122.166.107,n/a
WWW,dailymail.co.uk,www.dailymail.co.uk,23.214.154.30,n/a
WWW,telegraph.co.uk,www.telegraph.co.uk,23.214.131.63,n/a
WWW,independent.co.uk,www.independent.co.uk,151.101.17.184,n/a
WWW,independent.co.uk,www6.independent.co.uk,52.214.144.222,n/a
WWW,independent.co.uk,ipv6.independent.co.uk,52.214.144.222,n/a
WWW,independent.co.uk,www.ipv6.independent.co.uk,52.214.144.222,n/a
WWW,independent.co.uk,six.independent.co.uk,52.214.144.222,n/a
WWW,express.co.uk,www.express.co.uk,143.204.192.108,n/a
WWW,gov.uk,www.gov.uk,151.101.16.144,2a04:4e42:4::144
WWW,thesun.co.uk,www.thesun.co.uk,23.214.135.92,n/a
WWW,mirror.co.uk,www.mirror.co.uk,23.214.163.19,n/a
WWW,mirror.co.uk,www6.mirror.co.uk,54.228.202.0,n/a
WWW,mirror.co.uk,ipv6.mirror.co.uk,54.228.237.176,n/a
WWW,mirror.co.uk,www.ipv6.mirror.co.uk,54.228.202.0,n/a
WWW,mirror.co.uk,six.mirror.co.uk,54.228.237.176,n/a
WWW,pinterest.co.uk,www.pinterest.co.uk,151.101.16.84,n/a
WWW,rightmove.co.uk,www.rightmove.co.uk,213.161.77.102,n/a
WWW,metro.co.uk,www.metro.co.uk,192.0.79.33,n/a
WWW,tripadvisor.co.uk,www.tripadvisor.co.uk,192.229.182.189,n/a
WWW,hsbc.co.uk,www.hsbc.co.uk,91.214.6.22,n/a
WWW,lloydsbank.co.uk,www.lloydsbank.co.uk,141.92.90.142,n/a
WWW,argos.co.uk,www.argos.co.uk,2.22.141.38,n/a

JSON text format

```
{ "Sat Oct 23 2010 01:00:00 GMT+0100 (BST)": { "AT": { "hosts": 70, "hosts6": 2 }, "AU": { "hosts": 320, "hosts6": 0 }, "BE": {  
  "hosts": 61, "hosts6": 0 }, "BG": { "hosts": 50, "hosts6": 0 }, "CA": { "hosts": 1188, "hosts6": 0 }, "CH": { "hosts": 110, "hosts6": 11 }, "CZ": {  
  "hosts": 114, "hosts6": 1 }, "DE": { "hosts": 11069, "hosts6": 18 }, "DK": { "hosts": 894, "hosts6": 2 }, "ES": { "hosts": 84, "hosts6": 1 }, "EU": {  
  "hosts": 463, "hosts6": 125 }, "FR": { "hosts": 953, "hosts6": 88 }, "GB": { "hosts": 78001, "hosts6": 941 }, "HK": { "hosts": 62, "hosts6": 0 }, "IE": {  
  "hosts": 856, "hosts6": 6 }, "IN": { "hosts": 68, "hosts6": 0 }, "IT": { "hosts": 154, "hosts6": 0 }, "JP": { "hosts": 76, "hosts6": 6 }, "LU": {  
  "hosts": 130, "hosts6": 0 }, "NL": { "hosts": 1511, "hosts6": 40 }, "NO": { "hosts": 106, "hosts6": 2 }, "PL": { "hosts": 85, "hosts6": 0 }, "SE": {  
  "hosts": 205, "hosts6": 0 }, "SG": { "hosts": 174, "hosts6": 74 }, "US": { "hosts": 32741, "hosts6": 531 }, "ZZ": { "hosts": 3040, "hosts6": 5 } }, "Mon Dec 06  
2010 00:00:00 GMT+0000 (GMT)": { "AT": { "hosts": 69, "hosts6": 2 }, "AU": { "hosts": 308, "hosts6": 0 }, "BE": { "hosts": 69, "hosts6": 0 }, "CA": {  
  "hosts": 1214, "hosts6": 0 }, "CH": { "hosts": 116, "hosts6": 11 }, "CZ": { "hosts": 114, "hosts6": 4 }, "DE": { "hosts": 11359, "hosts6": 30 }, "DK": {  
  "hosts": 860, "hosts6": 2 }, "ES": { "hosts": 97, "hosts6": 1 }, "EU": { "hosts": 466, "hosts6": 125 }, "FR": { "hosts": 939, "hosts6": 114 }, "GB": {  
  "hosts": 76318, "hosts6": 960 }, "GG": { "hosts": 50, "hosts6": 0 }, "HK": { "hosts": 62, "hosts6": 0 }, "IE": { "hosts": 860, "hosts6": 4 }, "IN": {  
  "hosts": 68, "hosts6": 0 }, "IT": { "hosts": 158, "hosts6": 0 }, "JP": { "hosts": 92, "hosts6": 6 }, "LU": { "hosts": 150, "hosts6": 0 }, "NL": {  
  "hosts": 1751, "hosts6": 57 }, "NO": { "hosts": 106, "hosts6": 2 }, "PL": { "hosts": 84, "hosts6": 1 }, "RU": { "hosts": 72, "hosts6": 0 }, "SE": {  
  "hosts": 204, "hosts6": 0 }, "SG": { "hosts": 176, "hosts6": 74 }, "US": { "hosts": 33852, "hosts6": 692 }, "ZZ": { "hosts": 3276, "hosts6": 6 } }, "Sun Jan 30  
2011 00:00:00 GMT+0000 (GMT)": { "AT": { "hosts": 69, "hosts6": 2 }, "AU": { "hosts": 302, "hosts6": 0 }, "BE": { "hosts": 70, "hosts6": 0 }, "BG": {  
  "hosts": 53, "hosts6": 0 }, "CA": { "hosts": 1248, "hosts6": 0 }, "CH": { "hosts": 115, "hosts6": 11 }, "CZ": { "hosts": 104, "hosts6": 4 }, "DE": {  
  "hosts": 11320, "hosts6": 38 }, "DK": { "hosts": 848, "hosts6": 2 }, "ES": { "hosts": 93, "hosts6": 1 }, "EU": { "hosts": 475, "hosts6": 128 }, "FR": {  
  "hosts": 937, "hosts6": 119 }, "GB": { "hosts": 76990, "hosts6": 1010 }, "HK": { "hosts": 62, "hosts6": 0 }, "IE": { "hosts": 844, "hosts6": 4 }, "IN": {  
  "hosts": 69, "hosts6": 0 }, "IT": { "hosts": 158, "hosts6": 0 }, "JP": { "hosts": 97, "hosts6": 6 }, "LU": { "hosts": 158, "hosts6": 0 }, "NL": {  
  "hosts": 1726, "hosts6": 63 }, "NO": { "hosts": 111, "hosts6": 2 }, "PL": { "hosts": 84, "hosts6": 1 }, "RU": { "hosts": 71, "hosts6": 0 }, "SE": {  
  "hosts": 221, "hosts6": 0 }, "SG": { "hosts": 180, "hosts6": 73 }, "US": { "hosts": 32911, "hosts6": 776 }, "ZZ": { "hosts": 3685, "hosts6": 18 } }, "Mon Mar 21  
2011 00:00:00 GMT+0000 (GMT)": { "AT": { "hosts": 69, "hosts6": 2 }, "AU": { "hosts": 309, "hosts6": 0 }, "BE": { "hosts": 60, "hosts6": 0 }, "CA": {  
  "hosts": 1262, "hosts6": 0 }, "CH": { "hosts": 114, "hosts6": 11 }, "CZ": { "hosts": 84, "hosts6": 4 }, "DE": { "hosts": 11266, "hosts6": 41 }, "DK": {  
  "hosts": 854, "hosts6": 2 }, "ES": { "hosts": 95, "hosts6": 1 }, "EU": { "hosts": 476, "hosts6": 128 }, "FR": { "hosts": 942, "hosts6": 125 }, "GB": {  
  "hosts": 75889, "hosts6": 1032 }, "HK": { "hosts": 64, "hosts6": 0 }, "IE": { "hosts": 850, "hosts6": 4 }, "IN": { "hosts": 68, "hosts6": 0 }, "IT": {  
  "hosts": 157, "hosts6": 0 }, "JP": { "hosts": 97, "hosts6": 6 }, "LU": { "hosts": 158, "hosts6": 0 }, "NL": { "hosts": 1810, "hosts6": 63 }, "NO": {  
  "hosts": 117, "hosts6": 2 }, "PL": { "hosts": 92, "hosts6": 1 }, "RU": { "hosts": 59, "hosts6": 0 }, "SE": { "hosts": 216, "hosts6": 0 }, "SG": {  
  "hosts": 180, "hosts6": 73 }, "UA": { "hosts": 56, "hosts6": 0 }, "US": { "hosts": 33927, "hosts6": 786 }, "ZZ": { "hosts": 3824, "hosts6": 20 } }, "Wed May 04  
2011 01:00:00 GMT+0100 (BST)": { "AT": { "hosts": 56, "hosts6": 2 }, "AU": { "hosts": 312, "hosts6": 0 }, "BE": { "hosts": 68, "hosts6": 0 }, "CA": {  
  "hosts": 1338, "hosts6": 12 }, "CH": { "hosts": 108, "hosts6": 11 }, "CZ": { "hosts": 86, "hosts6": 5 }, "DE": { "hosts": 11229, "hosts6": 56 }, "DK": {  
  "hosts": 832, "hosts6": 4 }, "ES": { "hosts": 99, "hosts6": 1 }, "EU": { "hosts": 499, "hosts6": 138 }, "FR": { "hosts": 946, "hosts6": 163 }, "GB": {  
  "hosts": 75030, "hosts6": 1195 }, "HK": { "hosts": 65, "hosts6": 0 }, "IE": { "hosts": 930, "hosts6": 8 }, "IN": { "hosts": 68, "hosts6": 0 }, "IT": {  
  "hosts": 153, "hosts6": 0 }, "JP": { "hosts": 96, "hosts6": 6 }, "LU": { "hosts": 147, "hosts6": 0 }, "NL": { "hosts": 1833, "hosts6": 62 }, "NO": {  
  "hosts": 104, "hosts6": 2 }, "PL": { "hosts": 88, "hosts6": 2 }, "RU": { "hosts": 62, "hosts6": 0 }, "SE": { "hosts": 220, "hosts6": 3 }, "SG": {
```



SUMMARY / QUESTIONS

Crawler reaching its 15th year of data collection

Is there a slowdown in growth?

What else should we measure?

We need your feedback

- Send to contact@isoc-e.org

THANK YOU

Contact: ISOC England – contact@isoc-e.org



mythic beasts