

# IPv6 Website - Metrics, Measurement, and Progress

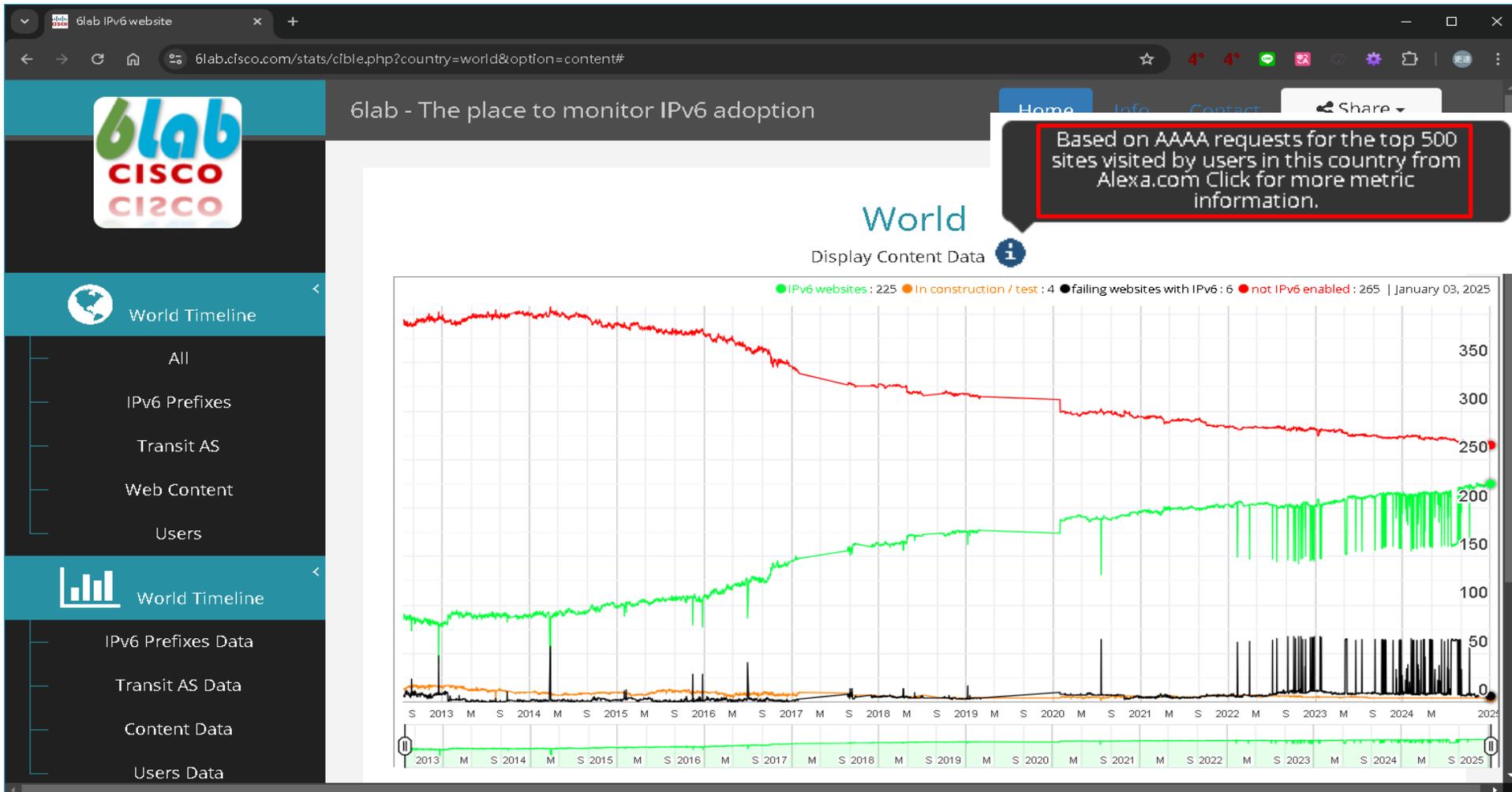
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# IPv6 User Availability and IPv6 Server Status

- Based on measurements from APNIC Lab, the global average IPv6 adoption rate among users has reached 40%, with approximately 27 economies exceeding the 50% threshold. This highlights that a substantial portion of users worldwide now rely on IPv6 as their primary connection method.
- However, assessing IPv6 support on the server side remains crucial and requires detailed data analysis to further accelerate IPv6 adoption.
- The availability of such data is currently limited, as most IPv6 website measurements historically depended on Alexa's "Top 1 Million Websites List," which was discontinued in May 2022, creating significant challenges for research in this domain.

# CISCO 6lab - The place to monitor IPv6 adoption

- CISCO 6lab's IPv6 measurements for the global and individual CC's Top 500 websites are still ongoing, but they continue to rely on Alexa's list.
- Currently, the IPv6 adoption rate among the global Top 500 websites (not the global average) is approximately 225 out of 500, or 45%.



# Vyncke IPv6 Deployment Aggregated Status

- The Vyncke website continues to measure the IPv6 adoption rates for Web, Email, and DNS across various CCs, but the data source remains Alexa's list.

IPv6 Deployment Aggregated Status

Limited to the top-50 per Top Level Domain extracted from the free Alexa top 1 million web sites (this list has been deactivated end of November 2016 then was reactivated, hence incomplete statistics) See the bottom of this page for more information on the tests. Click on a country to see specific statistics about top sites within this country or click on a flag:

- AfriNIC:** [Flags]
- APNIC:** [Flags]
- ARIN:** [Flags]
- LACNIC:** [Flags]
- RIPE:** [Flags]

Or do you prefer to have the [list of all fully IPv6-enabled sites?](#) Display per country [IPv6 prefixes](#).  
[Compare](#) IPv6 deployments among countries. [Predict](#) IPv6 deployments in one country. See all [IPv6-enabled BitTorrent peers](#). Same information as [XML](#).

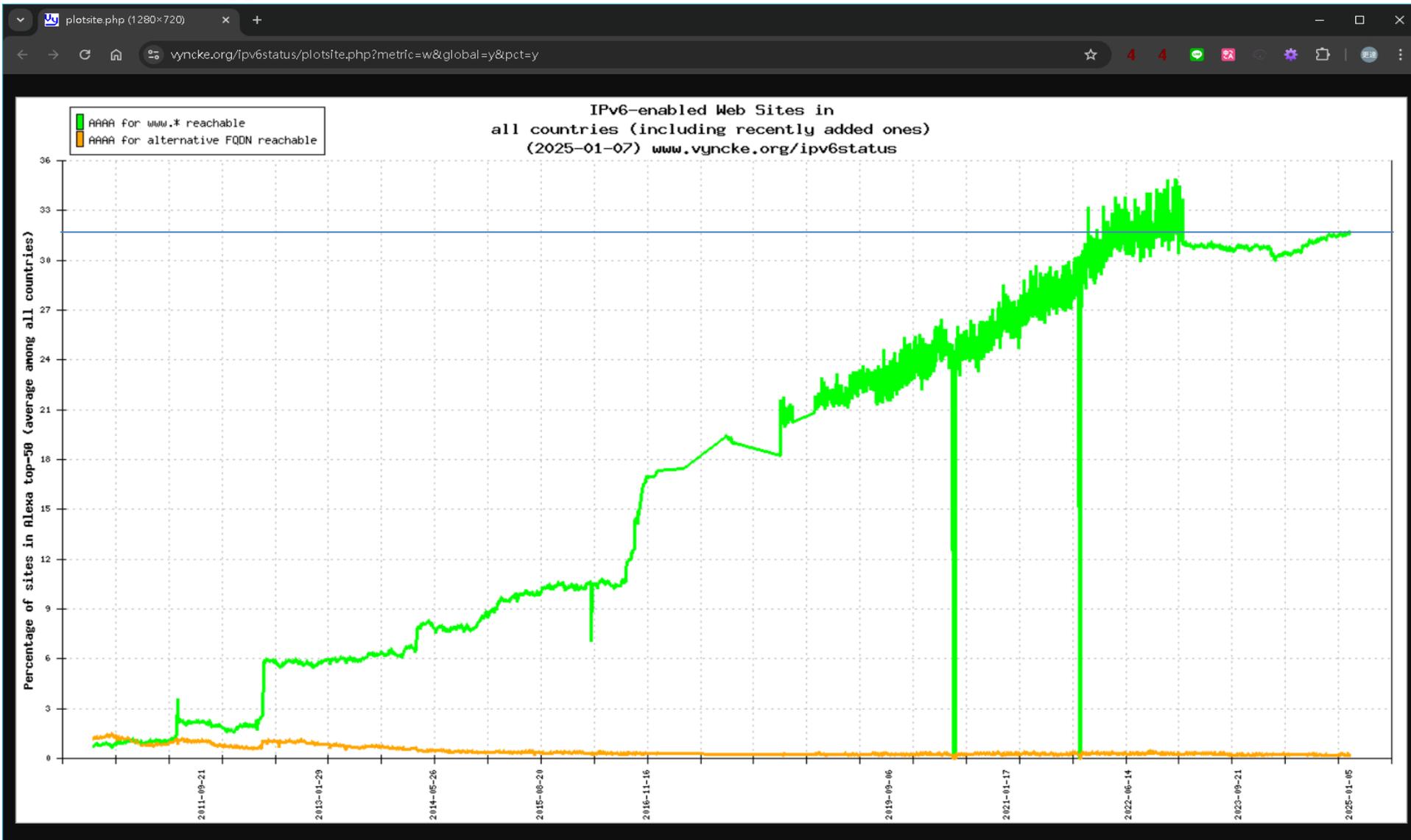
38 人說這個讚 · 成為朋友中第一個說讚的人 ·

Show countries with less than 50 sites:

Web (Alexa)						Email (Alexa)					DNS (Alexa)					IPv6 Enab (Google)			
Rank	Country	Sample size	Weighted	Green	Orange Test or broken	Rank	Country	Sample size	Weighted	Green	Orange Test or broken	Rank	Country	Sample size	Weighted	Green	Orange Test or broken	Rank	Country
1	<a href="#">Norway</a>	50	49.69%	60.0% (30)	2.0% (1)	1	<a href="#">Anguilla</a>	50	45.97%	76.0% (38)	0.0% (0)	1	<a href="#">New Zealand</a>	50	88.16%	96.0% (48)	0.0% (0)	1	<a href="#">France</a>
2	<a href="#">Netherlands</a>	50	38.89%	60.0% (30)	0.0% (0)	2	<a href="#">Vietnam</a>	50	50.91%	70.0% (35)	0.0% (0)	2	<a href="#">Australia</a>	50	89.38%	94.0% (47)	4.0% (2)	2	<a href="#">Germany</a>
3	<a href="#">Belgium</a>	50	74.32%	58.0% (29)	0.0% (0)	3	<a href="#">Libya</a>	50	63.18%	58.0% (29)	0.0% (0)	3	<a href="#">Germany</a>	50	88.57%	94.0% (47)	2.0% (1)	3	<a href="#">India</a>

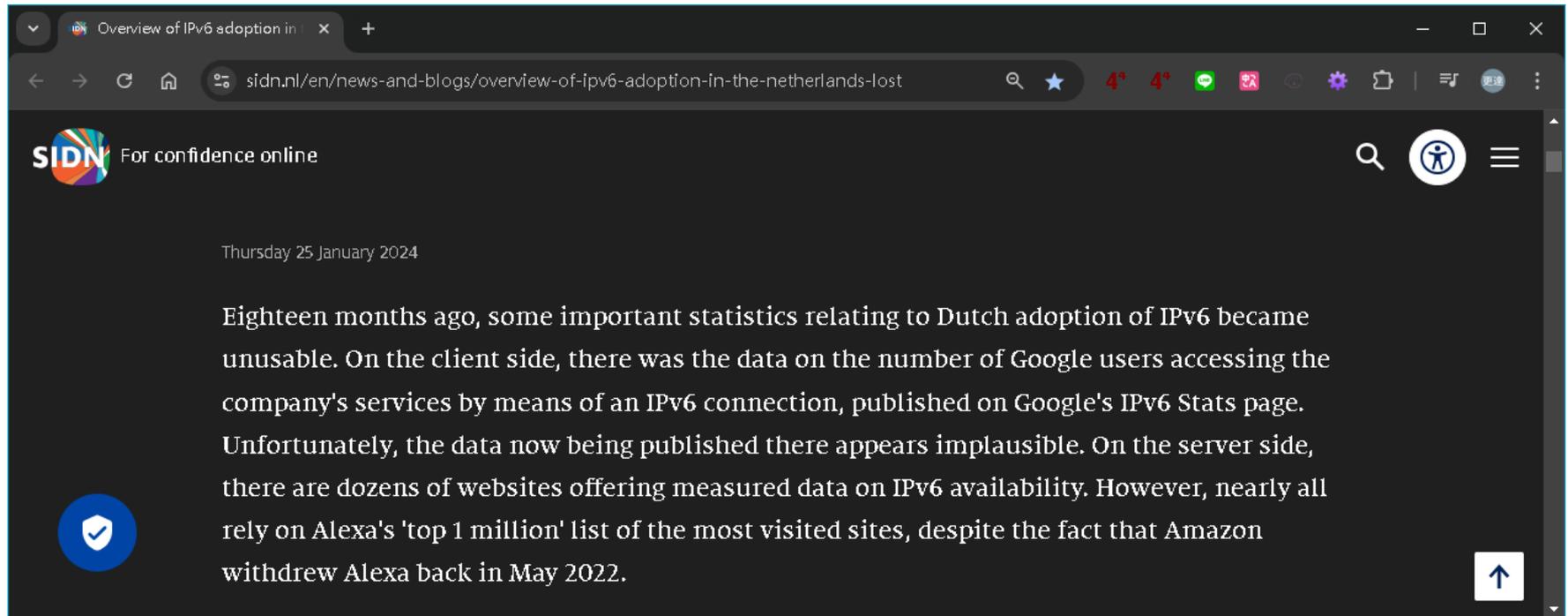
# IPv6 Deployment Aggregated Status

- The Vyncke website measures the global average IPv6 adoption rate for websites across CCs at approximately 31.5%.



# Any other IPv6 website measurement?

- The Netherlands' .nl Registry, SIDN(Stichting Internet Domeinregistratie Nederland), faces similar challenges and has identified another platform for measurements.
- Difficulty in quantifying IPv6 adoption complicates policymaking and enforcement, while the lack of a responsible entity for promotion risks harming internet accessibility, investment, and the Netherlands' infrastructure leadership.



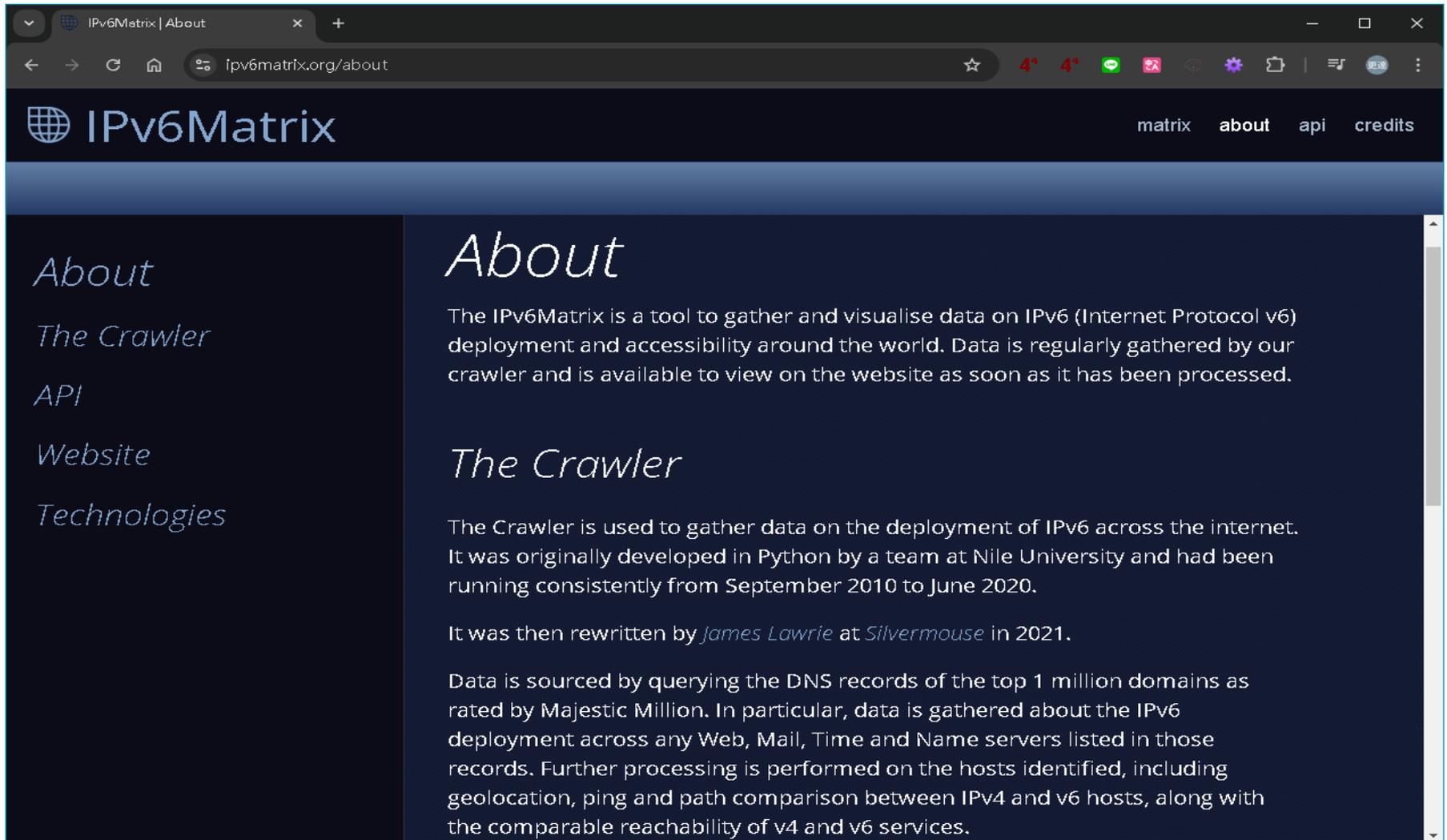
# Any other IPv6 website measurement?

- The Netherlands' SIDN has found another platform for continuous IPv6 website measurements to monitor the adoption of IPv6 on websites.



# IPv6Matrix

- This platform uses the Majestic Million top websites list for IPv6 measurements.



The screenshot shows a web browser window displaying the IPv6Matrix website. The browser's address bar shows the URL `ipv6matrix.org/about`. The website's header features the IPv6Matrix logo and navigation links for `matrix`, `about`, `api`, and `credits`. The main content area is titled "About" and contains the following text:

The IPv6Matrix is a tool to gather and visualise data on IPv6 (Internet Protocol v6) deployment and accessibility around the world. Data is regularly gathered by our crawler and is available to view on the website as soon as it has been processed.

*The Crawler*

The Crawler is used to gather data on the deployment of IPv6 across the internet. It was originally developed in Python by a team at Nile University and had been running consistently from September 2010 to June 2020.

It was then rewritten by *James Lawrie* at *Silvermouse* in 2021.

Data is sourced by querying the DNS records of the top 1 million domains as rated by Majestic Million. In particular, data is gathered about the IPv6 deployment across any Web, Mail, Time and Name servers listed in those records. Further processing is performed on the hosts identified, including geolocation, ping and path comparison between IPv4 and v6 hosts, along with the comparable reachability of v4 and v6 services.

Ref1: <https://ipv6matrix.org/about>

Ref2: <https://majestic.com/reports/majestic-million>

# IPv6Matrix

- The platform provides a convenient table sorting feature.

The screenshot displays the IPv6Matrix website interface. The main navigation bar includes links for 'matrix', 'about', and 'api'. The secondary navigation bar contains tabs for 'IPv6 Hosts', 'Dual Stack', 'Ping', 'Path', 'Reachability', 'IPv6 Domains', and 'Domain Search'. The current view is 'IPv6 Hosts', showing a table titled 'IPv6 Host percentage by Country for January 2025'. The table has four columns: 'Country', 'Hosts', 'IPv6 Enabled Hosts', and 'IPv6 Host (%)'. The 'Hosts' and 'IPv6 Enabled Hosts' columns show both total and average values. The 'IPv6 Host (%)' column shows the percentage of IPv6-enabled hosts. The table is sorted by the percentage of IPv6-enabled hosts in descending order. A sidebar on the left provides information about IPv6 hosts and the data source. At the bottom, there is a navigation bar with a date selector set to 'January 2025' and a 'Group by Country' dropdown menu.

**IPv6 Hosts**

Country: *Global*

Date: *January 2025*

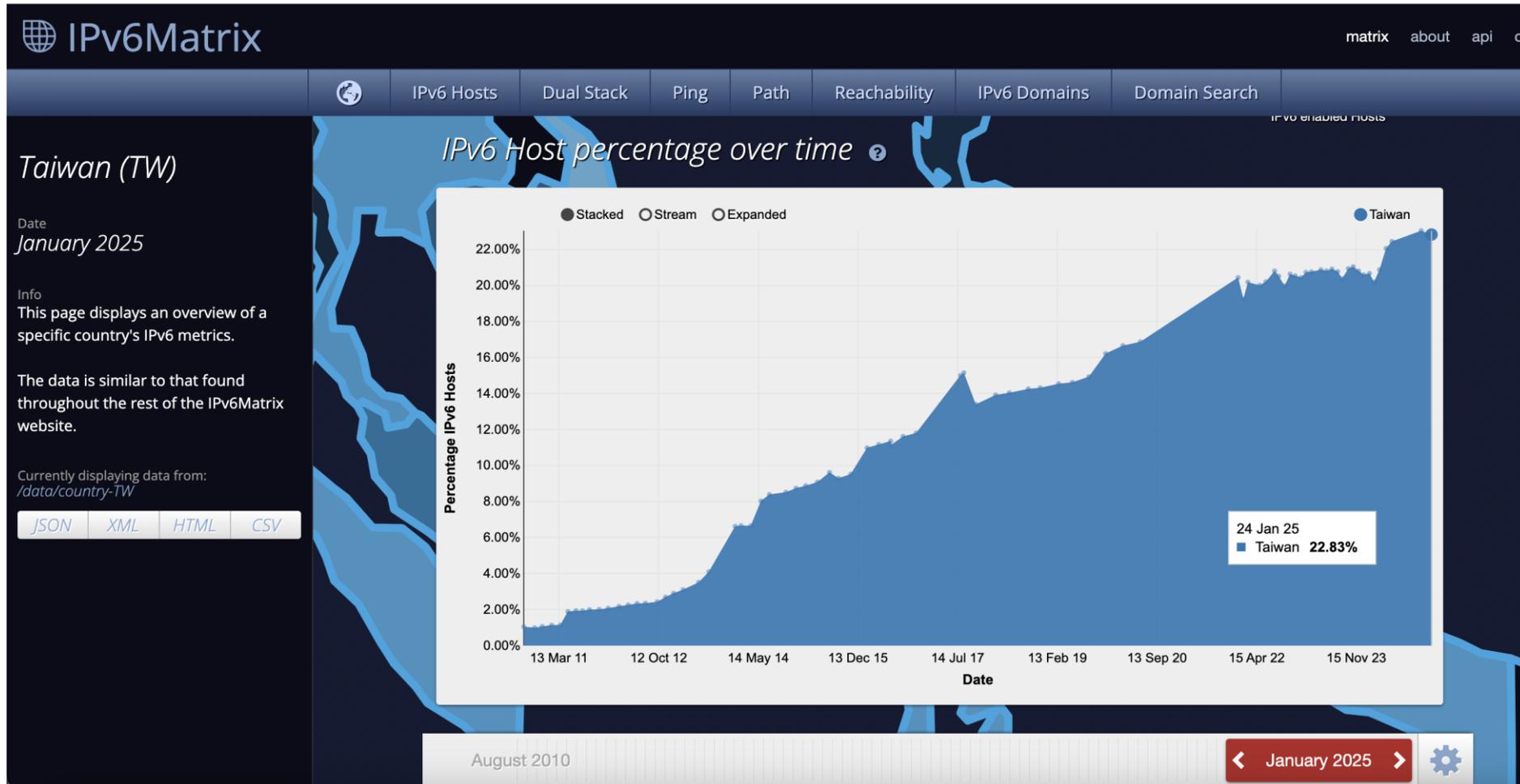
Info: This page displays an overview of IPv6 host adoption around the world. A 'host' is a computer connected to a network, in this case it defined by a hostname entry in the DNS records for a domain (eg. www.example.com, mx.example.com or ns1.example.com). A host may have have IPv4, IPv6 or both types of IP addresses listed in its DNS record using A and AAAA entries. If a host has a valid AAAA record it is considered an IPv6 enabled host. The data shows the percentage of

Country	Hosts	IPv6 Enabled Hosts	IPv6 Host (%)
	Total: 131 Average: 42905	Total: 2773348 Average: 21171	Average: 16.69%
Bouvet Island	186	186	100.00%
Colombia	49748	47788	96.06%
Austria	28030	20009	71.38%
United States	3366064	2043398	60.71%
China	132282	73490	55.56%
Sweden	18274	9951	54.45%
Ukraine	18102	9840	54.36%
Norway	4960	2687	54.17%
Denmark	24841	13444	54.12%
Canada	93574	45722	48.86%
Slovakia	7794	3759	48.23%
Czech Republic	37251	17786	47.75%
Netherlands	191429	91176	47.63%
Bhutan	91	41	45.05%
Belize	930	384	41.29%
Finland	18611	7535	40.49%

August 2010 | **January 2025** | Group by Country

# IPv6Matrix

- The platform also provides an IPv6 adoption trend chart, making it easy to observe.



# IPv6Matrix(Server) and APNIC IPv6 Lab(User)

- Through the raw data on the website, one can clearly see the measurement dates, quantities, and percentages of each CC in the Majestic Million top websites (Hosts) and IPv6-supported websites (Hosts6).
- In the final column, we have added the 7-day average IPv6 user update from APNIC Lab (as of 2025/2/7) to simultaneously observe and compare the IPv6 usage on both the server side and the user side.

CC	Population	IPv4 Addresses	Date3	Hosts	Hosts6	IPv6 %	APNIC IPv6 %
<i>AU</i>	26,735,965	46,232,832	<u>20250128</u>	47,832	4,057	<u>8.48%</u>	<u>44.66%</u>
<i>CN</i>	1,425,066,348	343,159,296	<u>20250128</u>	132,282	73,490	<u>55.56%</u>	<u>43.53%</u>
<i>ID</i>	280,109,342	19,014,400	<u>20250128</u>	4,673	924	<u>19.77%</u>	<u>15.08%</u>
<i>IN</i>	1,443,538,136	41,660,416	<u>20250128</u>	16,768	599	<u>3.57%</u>	<u>78.73%</u>
<i>JP</i>	122,536,753	188,696,832	<u>20250128</u>	138,738	25,160	<u>18.13%</u>	<u>58.09%</u>
<i>KR</i>	51,734,698	112,504,320	<u>20250128</u>	19,583	100	<u>0.51%</u>	<u>22.10%</u>
<i>TW</i>	23,953,574	35,712,256	<u>20250128</u>	7,557	1,735	<u>22.96%</u>	<u>61.35%</u>
<i>VN</i>	99,583,226	16,429,056	<u>20250128</u>	12,864	4,210	<u>32.73%</u>	<u>63.60%</u>

Ref1: <https://ipv6matrix.org/hosts>

Ref2: <https://stats.labs.apnic.net/ipv6/?s=IPv6+Capable&d=Auto&w=7&t=Auto>

# Observation and Discovery

- IPv6Matrix is currently the only known domain list that is regularly updated and continues to conduct IPv6 website measurements. (If you know of any other IPv6 server measurement platforms, please let us know.)
- The IPv6 user availability and the IPv6-enabled website rate are not necessarily directly correlated.
- The proportion of IPv6-enabled websites in CN is significantly leading and continues to rise.

Items: 8		20240505	20240608	20241125 <sup>+</sup>	Columns ▾	
CC <sup>Δ</sup>	Population	IPv4 Addresses	IPv6 %	IPv6 %	APNIC IPv6 %	
<i>AU</i>	26,735,965	46,381,312	7.29%	7.71%	8.30%	44.94%
<i>CN</i>	1,425,066,348	343,161,344	43.95%	44.48%	55.22%	43.48%
<i>ID</i>	280,109,342	19,008,768	18.09%	19.87%	19.18%	14.53%
<i>IN</i>	1,443,538,136	41,660,416	3.70%	3.58%	3.70%	78.46%
<i>JP</i>	122,536,753	188,984,576	13.03%	12.91%	12.84%	58.28%
<i>KR</i>	51,734,698	112,504,320	0.50%	0.51%	0.52%	22.92%
<i>TW</i>	23,953,574	35,712,256	22.06%	22.45%	23.04%	61.97%
<i>VN</i>	99,583,226	16,422,912	28.98%	31.53%	33.28%	60.87%

# Conclusion

- Global IPv6 user adoption has risen significantly, but server-side IPv6 support data remains unclear.
- Data collection is challenging due to limited tools and resources, especially after Alexa discontinued its "Top 1 Million Websites List" in 2022.
- **IPv6Matrix Advantages:**
  - The only known free IPv6 detection and statistics platform that is regularly updated.
  - Covers a wide range of CCs (132 CCs) and provides trend charts, making it easier to track IPv6 website trends.
- **IPv6Matrix Limitations:**
  - The detection interval is irregular, ranging from 1 to 5 months.
  - The specific website list and ASN used (cloud or local networks) cannot be clearly identified from the webpage.
- **Future work :**
  - We will focus on using the Tranco List(\*) to provide the Top websites list, categorized by ccTLDs, for each country, and analyze whether these websites support IPv6.
  - Increase ASN measurement to understand IPv6 deployment patterns, including ISPs, cloud services, and CC distribution.

# Appendix: Why we prefer using the Tranco List as a source for website data

- **Stable and Continuously Updated Data**
  - Tranco List is a research-oriented, regularly updated ranking of websites, providing a reliable source for IPv6 support detection.
- **Customizable List Size**
  - Users can select different list sizes (e.g., top 100,000 or 1 million websites), offering flexibility for measurement and in-depth analysis.
- **Research-Focused and Transparent**
  - Tranco is designed for academic research, with a transparent list generation process, suitable for analyzing IPv6 trends and providing reliable data.
- **Enhanced Accuracy with Multiple Ranking Sources**
  - Tranco combines multiple ranking sources (e.g., Majestic, Umbrella) to improve accuracy and avoid biases.
- **Filling the Alexa Gap**
  - After Alexa ceased its service, Tranco provides a stable alternative, effectively filling the data gap for IPv6 measurement.

※ Tranco List: A Research-Oriented Top Sites Ranking Hardened Against Manipulation. To use the lists from five providers: Cisco Umbrella, Majestic, Farsight, Chrome (CrUX), and Cloudflare Radar. Tranco is not affiliated with any of these providers.

**Thank you**