

IPv4.GLOBAL



Influences on IPv6 Deployment

May 2022

TRANSPARENT.

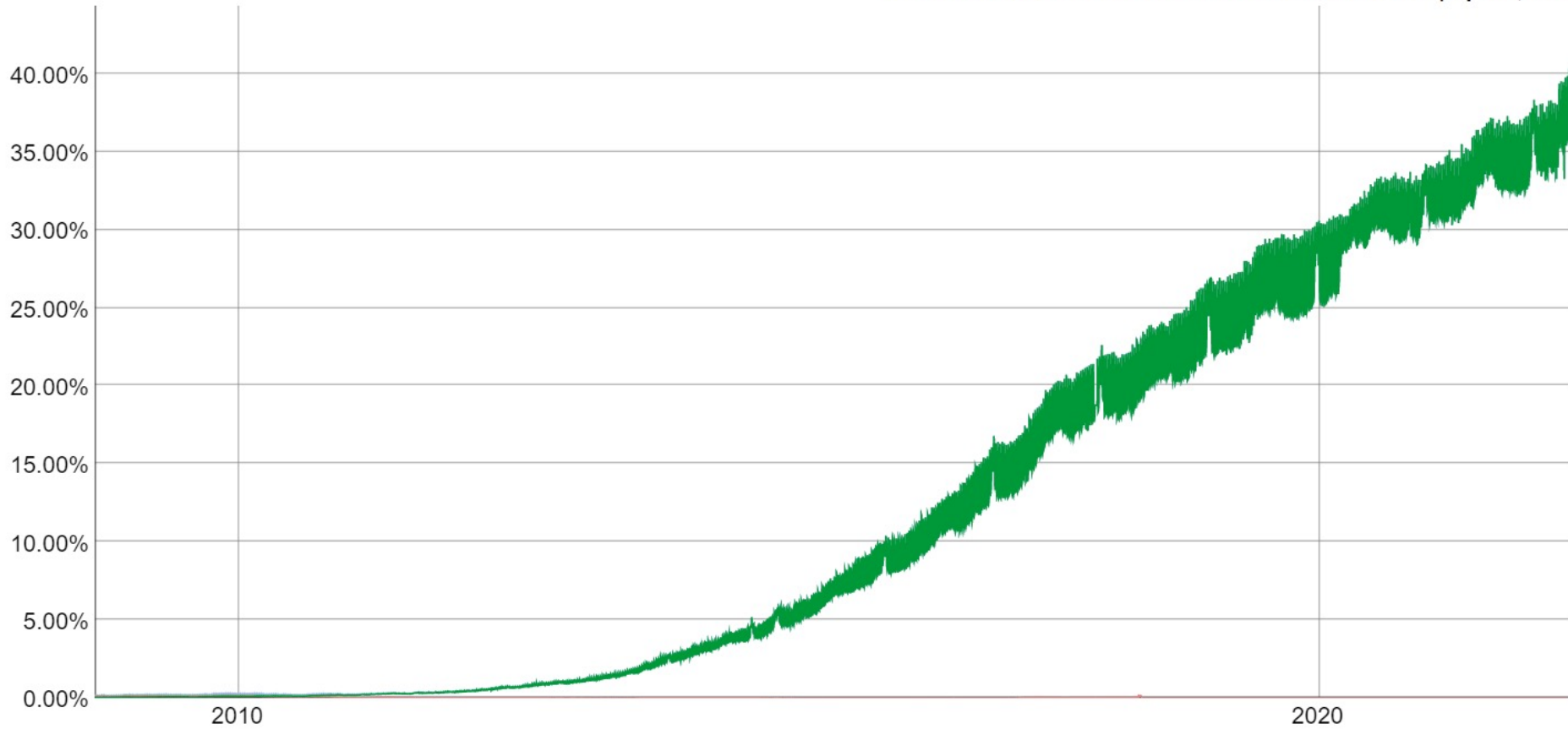
EXPERIENCED.

RELIABLE.

IPv6 Adoption

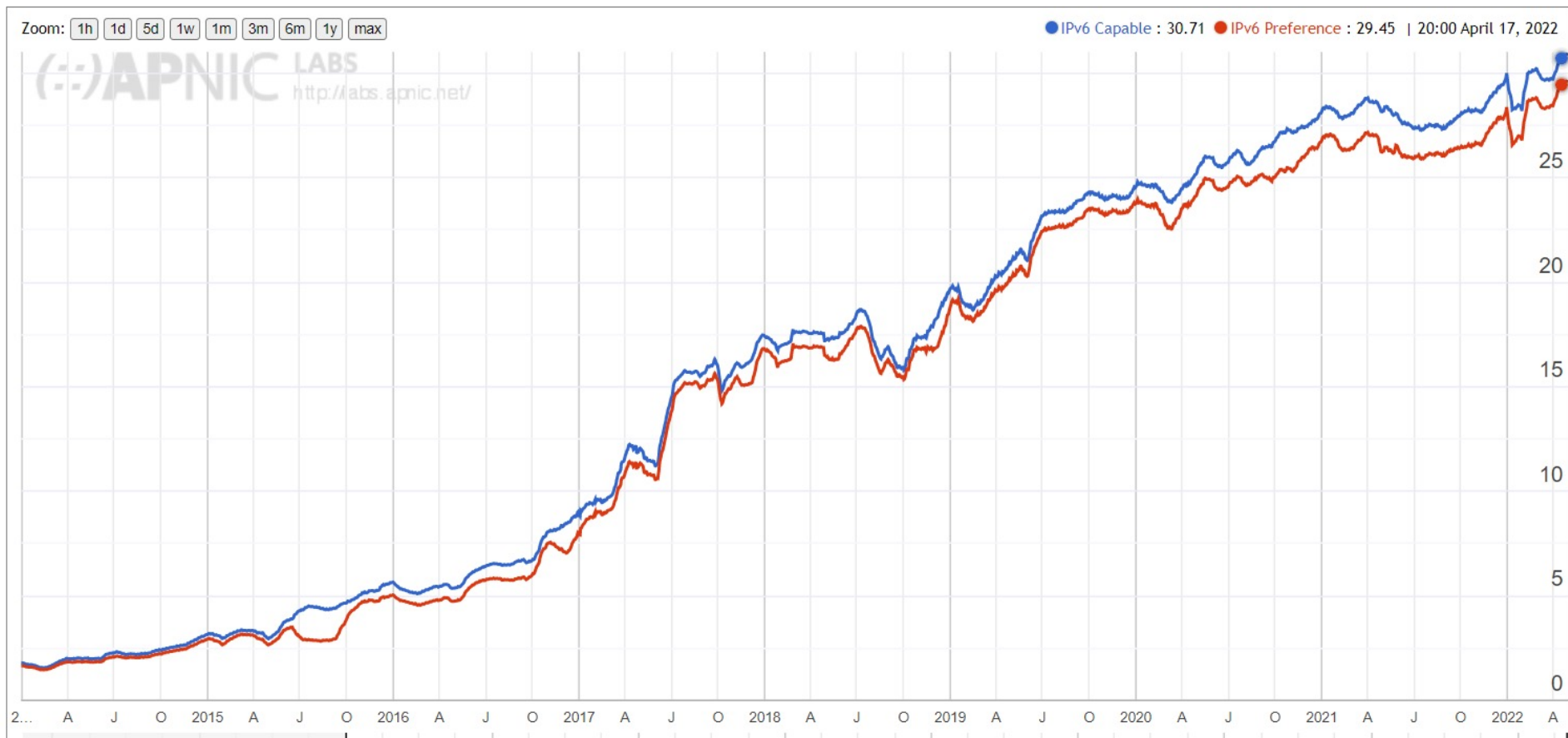
We are continuously measuring the availability of IPv6 connectivity among Google users. The graph shows the percentage of users that access Google over IPv6.

Native: 40.33% 6to4/Teredo: 0.00% Total IPv6: 40.33% | Apr 30, 2022



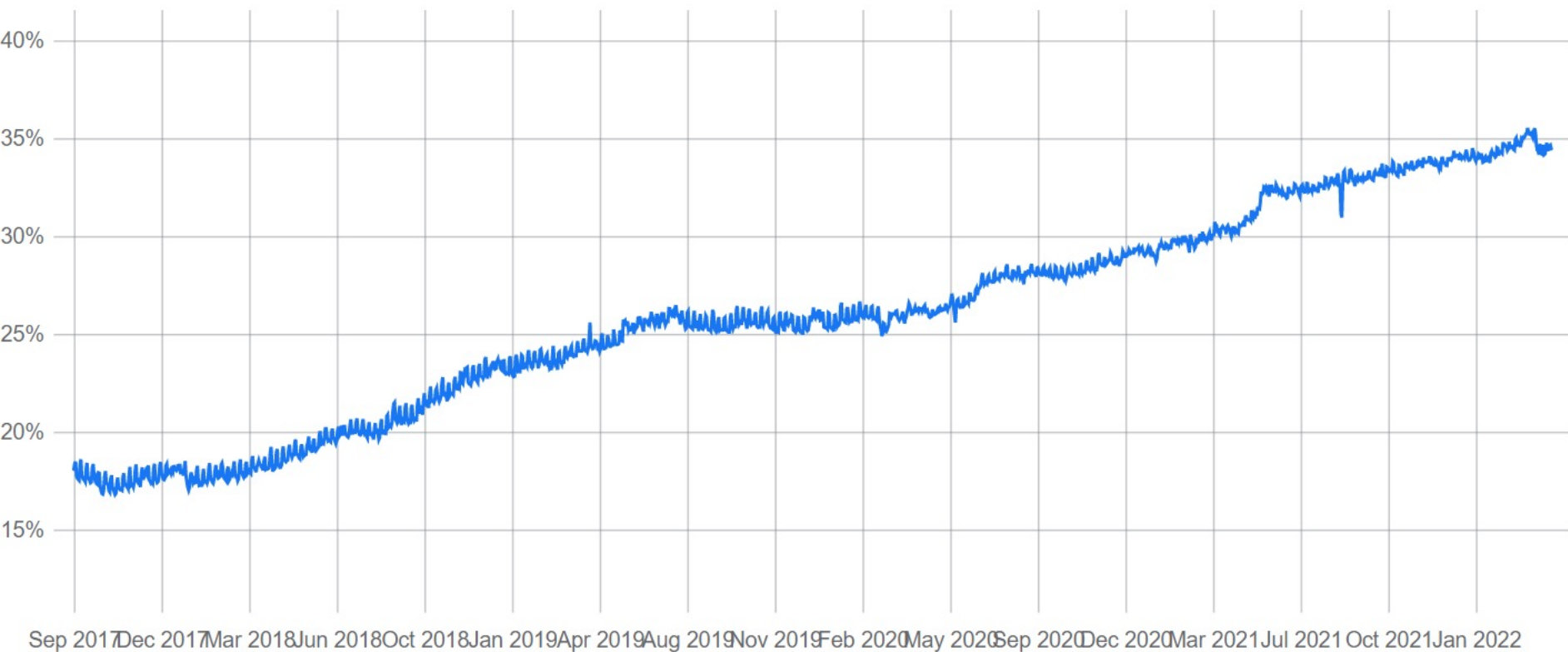
<https://www.google.com/intl/en/ipv6/statistics.html>

Use of IPv6 for World (XA)



<https://stats.labs.apnic.net/ipv6/XA>

- IPv6 Adoption - Weekly Growth - Monthly Growth



https://www.facebook.com/ipv6/?tab=ipv6_total_adoption

CC	Country	IPv6 Capable	IPv6 Preferred
IN	India, Southern Asia, Asia	77.58%	76.61%
BE	Belgium, Western Europe, Europe	63.80%	63.42%
MY	Malaysia, South-Eastern Asia, Asia	60.72%	60.09%
SA	Saudi Arabia, Western Asia, Asia	58.48%	57.16%
MS	Montserrat, Caribbean, Americas	57.67%	57.41%
GR	Greece, Southern Europe, Europe	52.82%	52.67%
DE	Germany, Western Europe, Europe	52.64%	50.81%
LK	Sri Lanka, Southern Asia, Asia	50.78%	50.44%
VN	Vietnam, South-Eastern Asia, Asia	49.77%	49.44%
FI	Finland, Northern Europe, Europe	49.28%	47.16%
UY	Uruguay, South America, Americas	48.97%	48.73%
US	United States of America, Northern America, Americas	48.75%	46.94%
TH	Thailand, South-Eastern Asia, Asia	45.95%	45.73%
MX	Mexico, Central America, Americas	43.94%	43.63%
JP	Japan, Eastern Asia, Asia	43.66%	41.52%
HU	Hungary, Eastern Europe, Europe	42.74%	42.40%
TW	Taiwan, Eastern Asia, Asia	42.42%	41.69%
FR	France, Western Europe, Europe	41.64%	39.46%
IL	Israel, Western Asia, Asia	41.23%	39.37%
AE	United Arab Emirates, Western Asia, Asia	38.96%	38.58%
PT	Portugal, Southern Europe, Europe	38.26%	37.79%
GB	United Kingdom of Great Britain and Northern Ireland, Northern Europe, Europe	36.19%	35.71%
LU	Luxembourg, Western Europe, Europe	35.56%	35.41%
EE	Estonia, Northern Europe, Europe	35.42%	35.08%
BR	Brazil, South America, Americas	35.01%	34.75%
AX	Aland Islands, Northern Europe, Europe	34.92%	34.38%
LI	Liechtenstein, Western Europe, Europe	34.72%	33.24%
NL	Netherlands, Western Europe, Europe	33.57%	32.96%

<https://stats.labs.apnic.net/ipv6/XA>

Ranking *	Country / Region	IPv6 Adopti...	Weekly Growth	Monthl y...
1	India	68.61%	0.27%	0.17%
8	Malaysia	61.66%	0.04%	0.22%
2	United States	59.46%	0.2%	0.23%
7	Germany	59.33%	1.26%	2.36%
86	Seychelles	58.87%	2.32%	6.99%
23	Belgium	56.99%	0.56%	0.97%
137	St-Barthélemy	56.21%	7.99%	41.94%
9	France	54.87%	0.46%	1.76%
4	Vietnam	52.57%	0.2%	0.45%
16	Taiwan	52.13%	0.49%	1.03%
14	Saudi Arabia	51.34%	0.31%	1.91%
29	Greece	51.34%	0.45%	0.36%
48	Uruguay	49.52%	2.09%	4.31%
13	Japan	49.47%	0.23%	0.84%
44	Finland	48.6%	0.29%	2.32%
6	Thailand	48.02%	0.27%	0.41%
25	Myanmar	46.91%	0.96%	8.32%
37	Sri Lanka	46.34%	0.41%	0.19%
39	Hungary	45.3%	1.01%	1.39%

https://www.facebook.com/ipv6/?tab=ipv6_country

Rank ▲	Participating Network ▼	ASN(s) ▼	IPv6 deployment ▼
1	RELIANCE JIO INFOCOMM LTD	55836, 64049	93.93%
2	Comcast	7015, 7016, 7725, 7922, 11025, 13367, 13385, 20214, 21508, 22258, 22909, 33287, 33489, 33490, 33491, 33650, 33651, 33652, 33653, 33654, 33655, 33656, 33657, 33659, 33660, 33661, 33662, 33664, 33665, 33666, 33667, 33668, 36732, 36733	71.62%
3	Combined US Mobile Carriers	3651, 6167, 10507, 20057, 21928, 22394	87.68%
4	Charter Communications	7843, 10796, 11351, 11426, 11427, 12271, 20001, 20115, 33363	54.80%
5	ATT	6389, 7018, 7132	73.43%
6	T-Mobile USA	21928	92.50%
7	Deutsche Telekom AG	3320	74.24%
8	Orange Business Services	3215	72.62%
9	Claro Brasil	4230, 28573	74.30%
10	Verizon Wireless	6167, 22394	83.53%
11	KDDI	2516	72.74%
12	TELMEX	8151	64.36%
13	Viettel Group	7552	57.69%
14	Vivo	10429, 11419, 18881, 19182, 26599, 27699	71.72%
15	Free	12322	88.53%



Reliance Jio

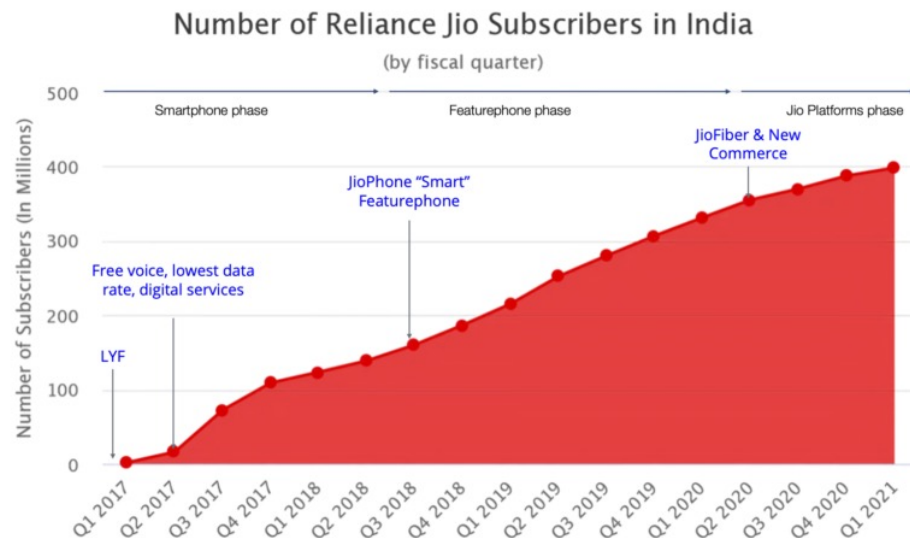
Launched 4G in September 2016

Free until March 31, 2017

\$10 handset

- 1 month – 16 million subscribers
- 3 month – 50 million
- 4 years – 400 million

Reliance Jio (Jio Platforms Ltd.) has grown to 400M paid subscribers in 4 years



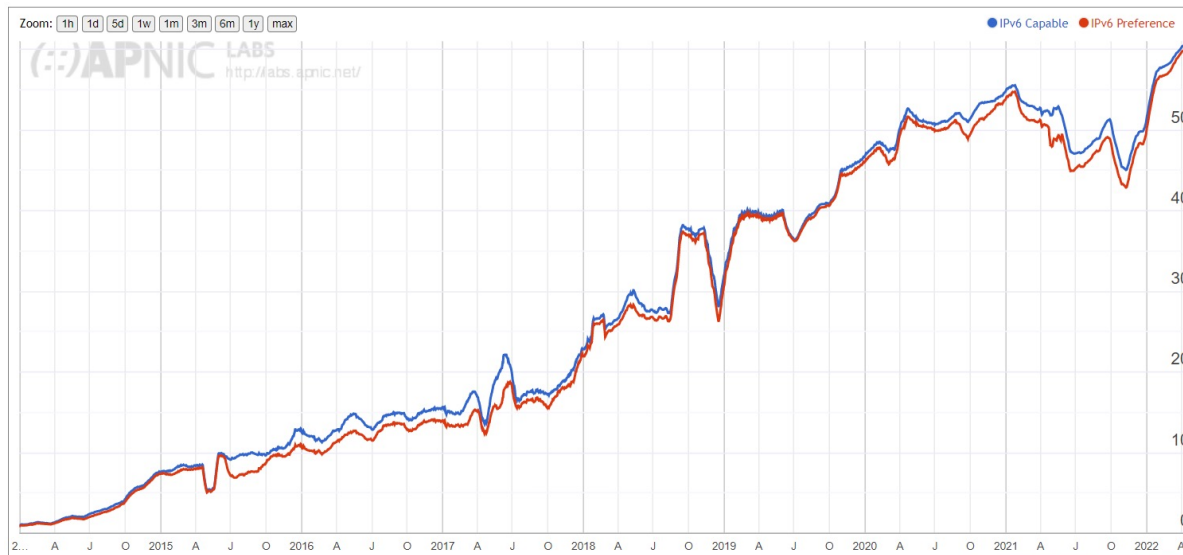
TM Net, Unifi

Public-private partnership:

- TM funded if they met goals
- 2005 IPv6 NAv6, 2020 IPv6 CE mandate

FTTH released in 2018

Targeting homes with income < US\$1,000 per month



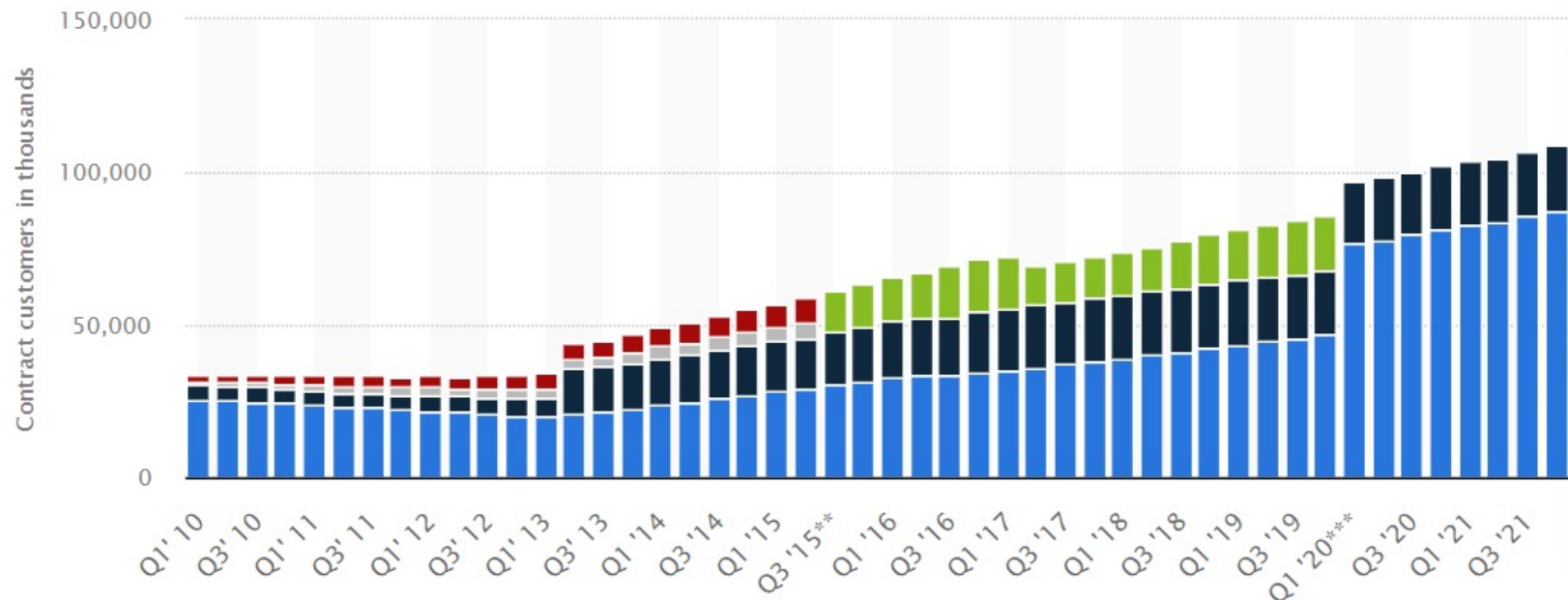
<https://stats.labs.apnic.net/ipv6/MY>

Initial participant in World IPv6 Day July 2021

World IPv6 Launch, June 2022:

50% of traffic went to IPv6 immediately

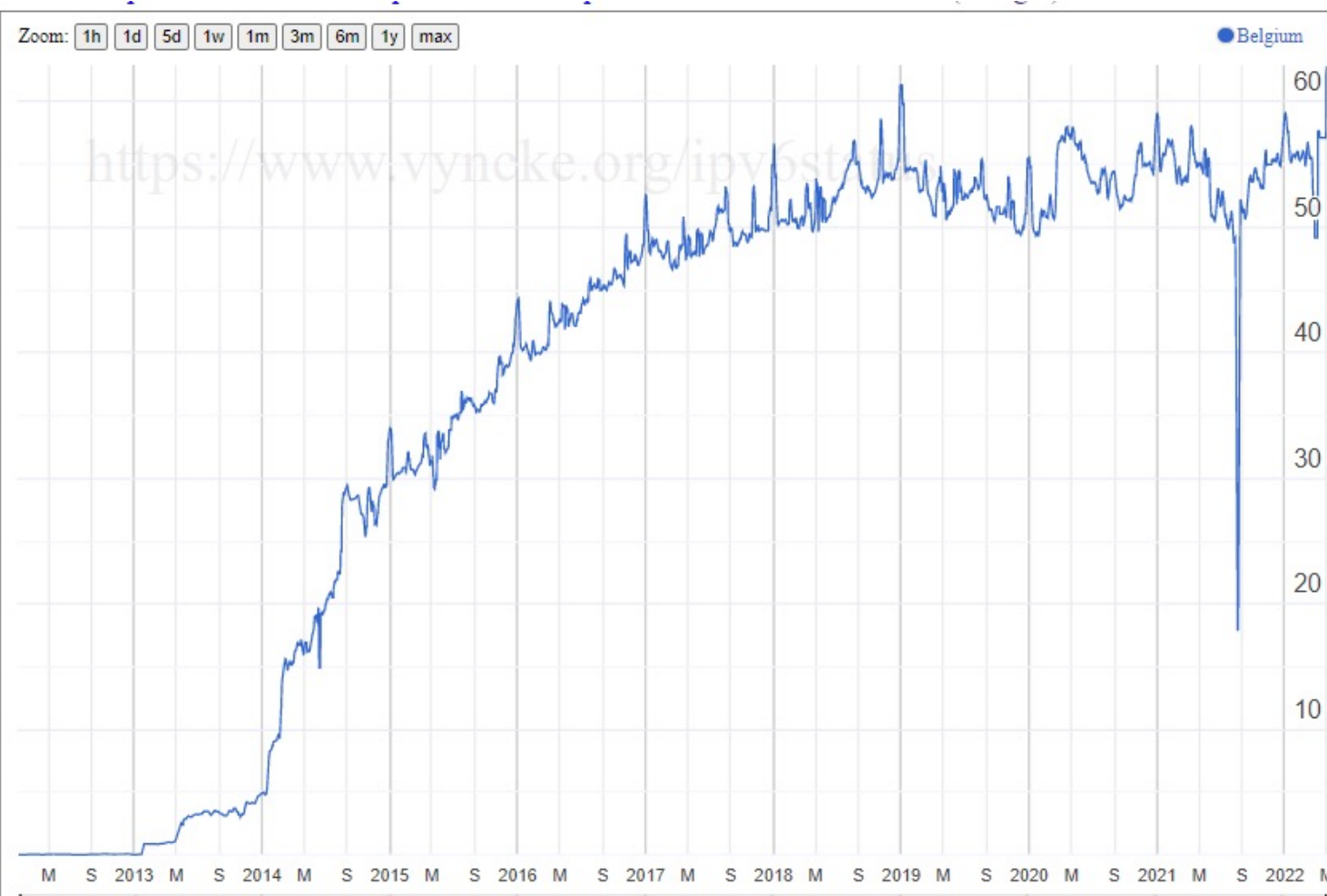
CGN cost cut in half



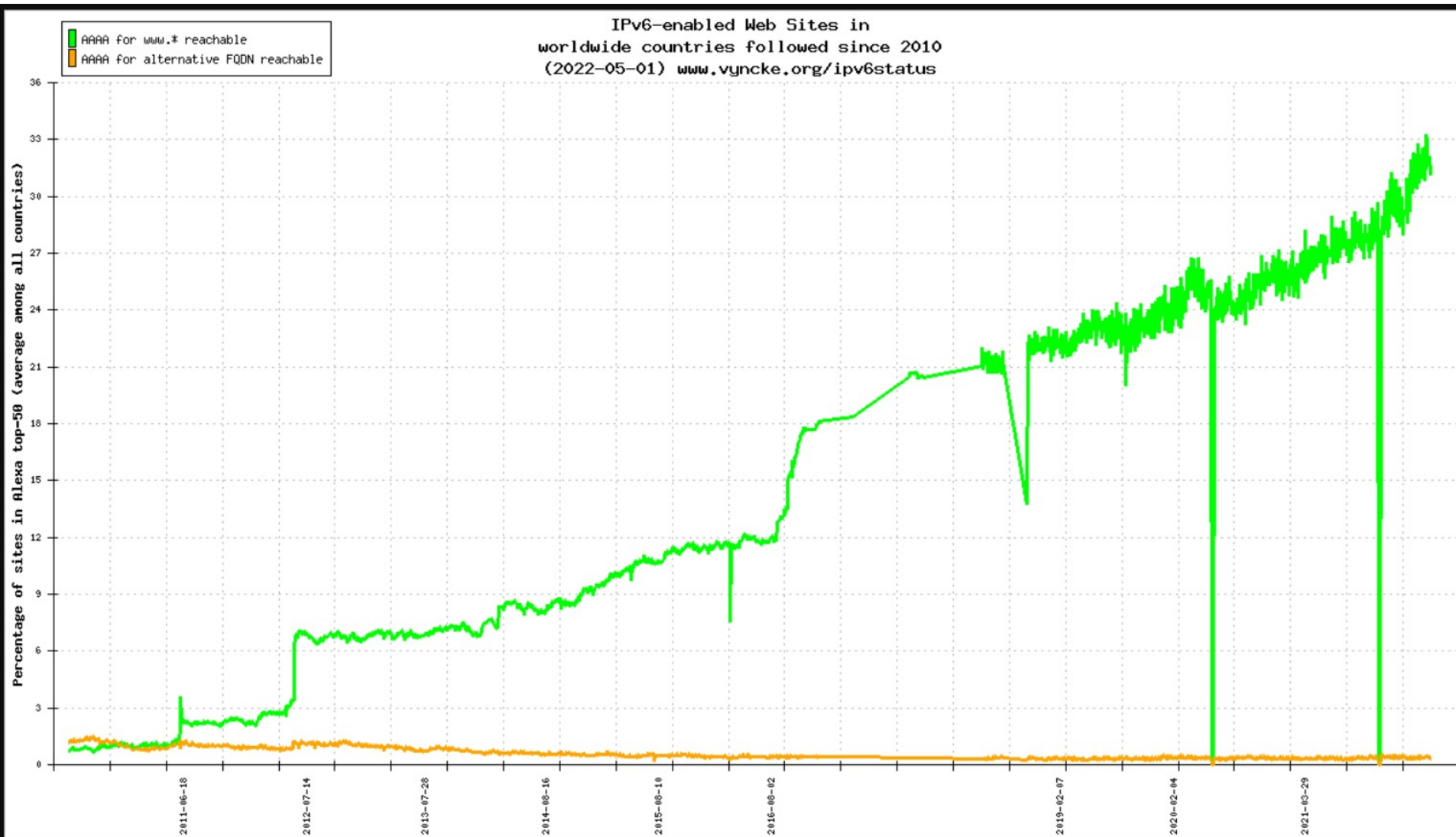
Belgium

Erik Vyncke and Gunter van der Velde

National authorities worried about finding criminals behind CGN



Rank	Country	Sample Size	Weighted	Green
1	Colombia	50	51.81%	68.0% (34)
2	Iceland	50	64.97%	60.0% (30)
3	Norway	50	48.83%	58.0% (29)
4	Netherlands	50	40.23%	58.0% (29)
5	Liechtenstein	50	56.19%	58.0% (29)
6	Belgium	50	67.12%	58.0% (29)
7	Samoa	50	61.90%	58.0% (29)
8	Sweden	50	68.36%	56.0% (28)
9	Greece	50	64.26%	54.0% (27)
10	Tonga	50	34.41%	52.0% (26)
11	Albania	50	67.56%	50.0% (25)
12	United States of America	50	67.17%	48.0% (24)
13	Nigeria	50	63.49%	48.0% (24)
14	Laos	50	60.60%	48.0% (24)
15	New Zealand	50	60.16%	46.0% (23)













<https://www.vyncke.org/ipv6status/plotsite.php?metric=w&global=legacy&pct=y>

Percentage of Alexa Top 1000 websites currently reachable over IPv6











Measurements every hour from AS35425



High IPv6 Content

Name	Alexa (Nov 2016) country/global	Web	Mail	DNS
 mangaraw.co <i>whois</i>	1/158	www.mangaraw.co 2a06:98c1:3120::3 2022-03-21 CDN	FAILED	sean.ns.cloudflare.com elsa.ns.cloudflare.com 2606:4700:50::adf5:3a6f 2/2 2022-03-21
 convertio.co <i>whois</i>	2/636	FAILED	FAILED	ns-1465.awsdns-55.org ns-1957.awsdns-52.co.uk ns-124.awsdns-15.com ns-921.awsdns-51.net 2600:9000:5303:9900::1 4/4 2016-03-04
 mercadolibre.com.co <i>whois</i>	3/920	FAILED	alt2.aspmx.l.google.com 2a00:1450:4010:c1c::1b 2012-08-26	ns-26.awsdns-03.com ns-2009.awsdns-59.co.uk ns-1146.awsdns-15.org ns-882.awsdns-46.net 2600:9000:5303:7200::1 4/4 2018-06-02
 ibb.co <i>whois</i>	4/943	FAILED	FAILED	FAILED
 videocampaign.co <i>whois</i>	5/1127	FAILED	FAILED	FAILED
 iegybest.co <i>whois</i>	6/1318	www.iegybest.co 2606:4700:3038::6815:ebba 2021-05-11 CDN	FAILED	james.ns.cloudflare.com summer.ns.cloudflare.com 2606:4700:50::a29f:2609 2/2 2021-05-11
 mixdrop.co <i>whois</i>	7/1456	FAILED	FAILED	dns42.cloudns.net dns41.cloudns.net dns44.cloudns.net dns43.cloudns.net 2a06:fb00:1::3:200 4/4 2019-07-12
 thenetnaija.co <i>whois</i>	8/1487	www.thenetnaija.co 2606:4700:3032::6815:1d30 2021-12-04 CDN	FAILED	ian.ns.cloudflare.com venus.ns.cloudflare.com 2606:4700:50::adf5:3aeb 2/2 2021-12-04
 dramacool9.co <i>whois</i>	9/1982	www.dramacool9.co 2a06:98c1:3121::b 2019-01-28 CDN	mx.yandex.net 2a02:6b8::311 2019-01-28	tom.ns.cloudflare.com elma.ns.cloudflare.com 2606:4700:50::adf5:3a9a 2/2 2019-01-29
 watchfreejavonline.co <i>whois</i>	10/1985	www.watchfreejavonline.co 2606:4700:3035::ac43:a8ad 2021-11-11 CDN	FAILED	dara.ns.cloudflare.com miles.ns.cloudflare.com 2606:4700:58::adf5:3bcf 2/2 2021-11-11

Low IPv6 Content

Name	Alexa (Nov 2016) country/global	Web	Mail	DNS
 google.com.ec <i>whois</i>	1/4906	www.google.com.ec 2a00:1450:4007:819::2003 2011-06-08	smtp.google.com 2a00:1450:400c:c0b::1b 2012-07-26	ns3.google.com ns4.google.com ns1.google.com ns2.google.com 2001:4860:4802:34::a 4/4 2018-06-02
 mercadolibre.com.ec <i>whois</i>	2/9475	FAILED	aspmx3.googlemail.com 2a00:1450:4010:c1c::1a 2012-08-25	ns-2046.awsdns-63.co.uk ns-687.awsdns-21.net ns-81.awsdns-10.com ns-1323.awsdns-37.org 2600:9000:5305:2b00::1 4/4 2018-06-02
 sri.gob.ec <i>whois</i>	3/14596	FAILED	FAILED	FAILED
 loveread.ec <i>whois</i>	4/19126	FAILED	FAILED	FAILED
 jess.gob.ec <i>whois</i>	5/19831	FAILED	FAILED	pdns07.domaincontrol.com pdns08.domaincontrol.com 2603:5:22f1::35 2/2 2020-05-26
 itb.edu.ec <i>whois</i>	6/25264	FAILED	alt1.aspmx.l.google.com 2a00:1450:4013:c16::1b 2018-12-06	FAILED
 waca.ec <i>whois</i>	7/30787	FAILED	alt2.aspmx.l.google.com 2a00:1450:4010:c1c::1b 2015-07-31	ns-1033.awsdns-01.org ns-972.awsdns-57.net ns-245.awsdns-30.com ns-1663.awsdns-15.co.uk 2600:9000:5306:7f00::1 4/4 2016-10-26
 msp.gob.ec <i>whois</i>	8/32742	FAILED	FAILED	pichincha.andinanet.net tungurahua.andinanet.net 2800:370:10::110 2/2 2014-03-07
 gestiondocumental.gob.ec <i>whois</i>	9/33540	FAILED <i>CDN</i>	FAILED	dns42.nic.ec dns44.nic.ec dns41.nic.ec dns43.nic.ec 2a06:fb00:1::3:200 4/4 2020-05-26
 ups.edu.ec <i>whois</i>	10/39606	FAILED	FAILED	ns3.telconet.net ns1.telconet.net ns2.telconet.net 2800:2a0:11:3:512::12 3/3 2017-04-14

<https://www.vyncke.org/ipv6status/detailed.php?country=ec>

Since 2011, Amazon has bought 114,830,336 IPv4 addresses

Using IPv4.Global pricing data, estimated US \$2 *billion*

AWS supports IPv6 for many services

Web Site Speed

“Every 100ms of latency costs 1% in Sales”

Amazon

“100-millisecond delay in website load time can hurt conversion rates by 7%”

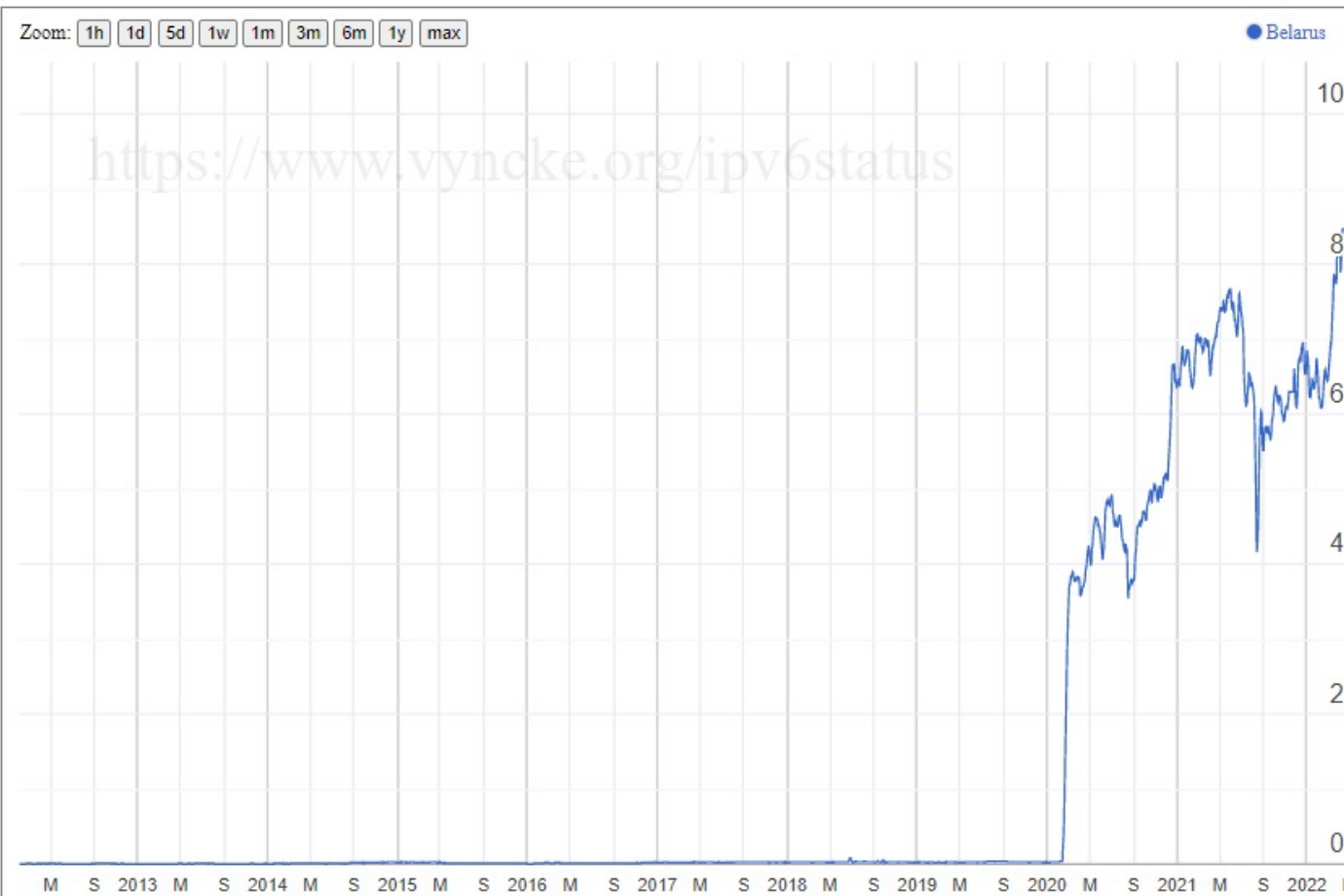
Akamai

Google

“Traffic and revenue from Google searchers in the experimental group dropped by 20%. . . Half a second delay caused a 20% drop in traffic.”

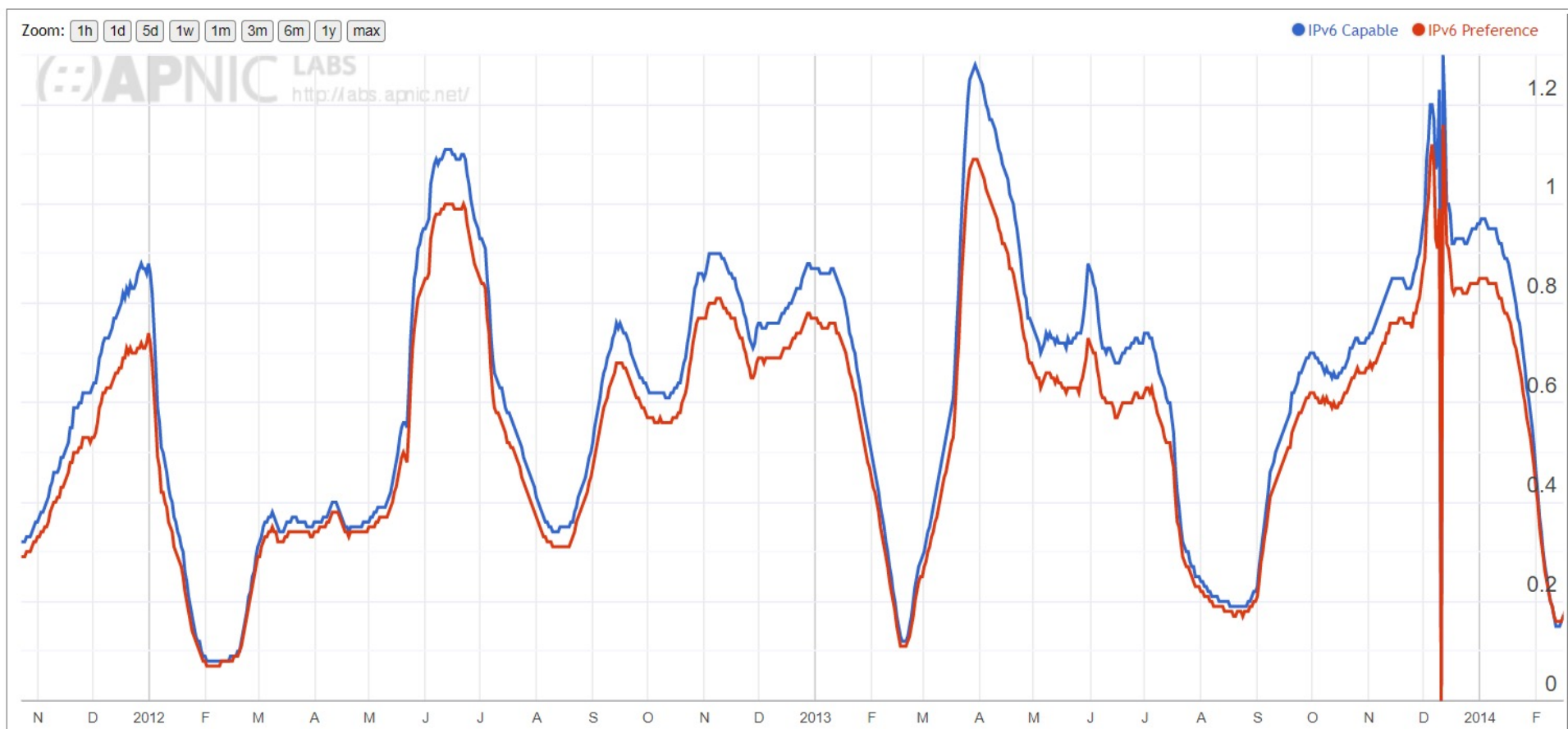
Belarus

Starting January 1, 2020, Belarusian ISPs will have to enable IPv6 support for all customer connections.



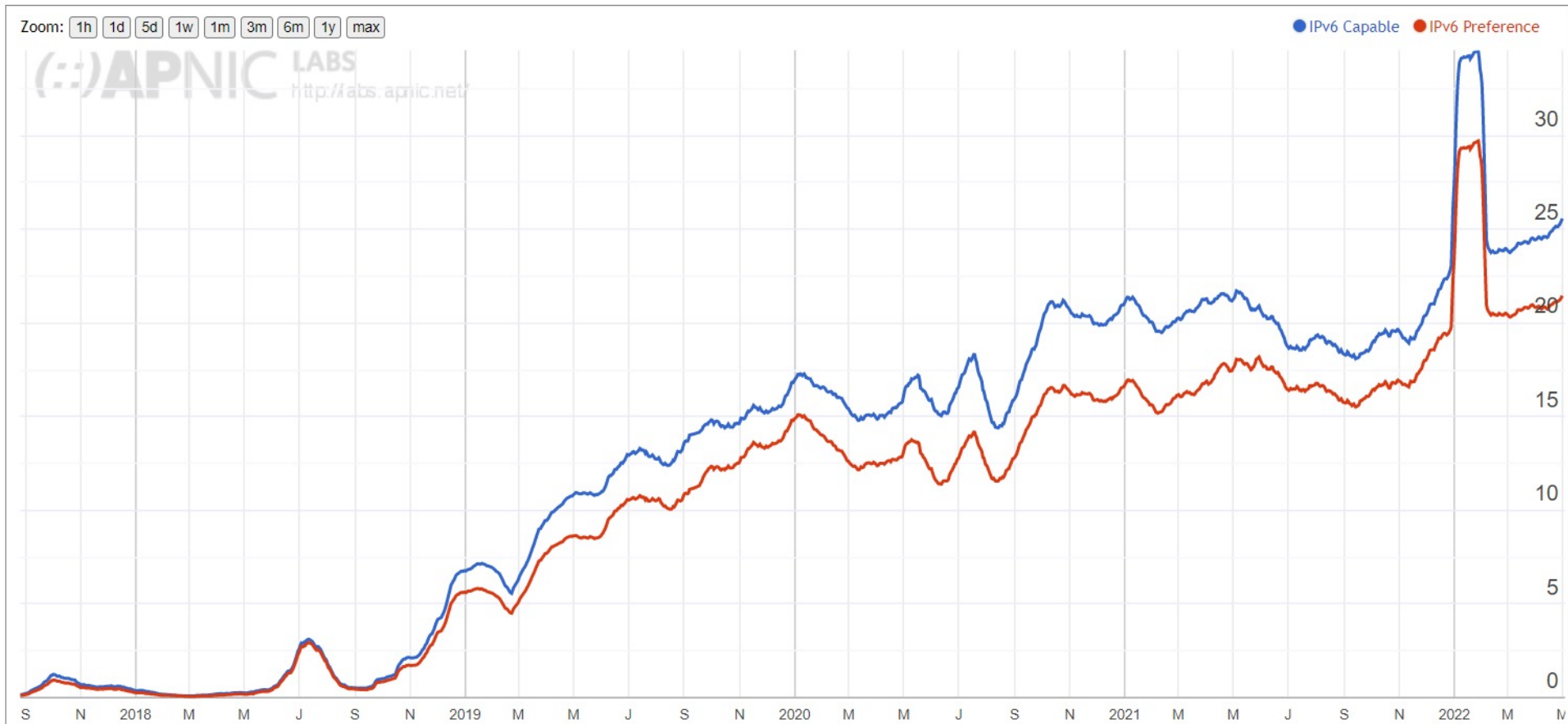
China

Mandate: enable IPv6 to 9 million users by the end of 2013



China

Mandate (2017): enable IPv6 to 20% by 2018, 50% by 2020, 100% by 2025



<https://stats.labs.apnic.net/ipv6/CN>

1. Providers who want to grow or be cheap need IPv6
2. IPv6 hosting on by default
3. IPv6 speed is better for engagement, SEO
4. Public-Private Partnerships work better than mandates