IPv6 Deployment

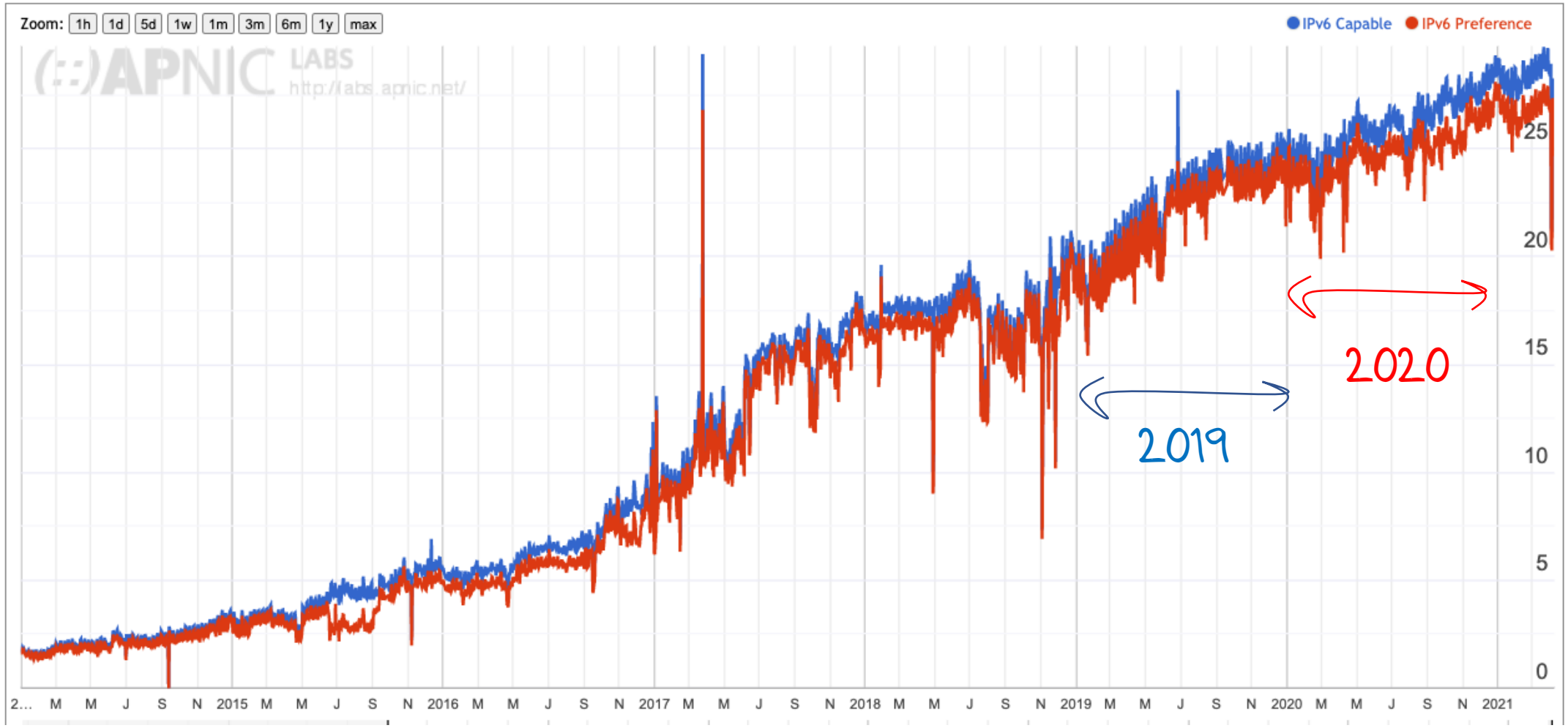
Geoff Huston AM
Chief Scientist
APNIC Labs

Some Questions

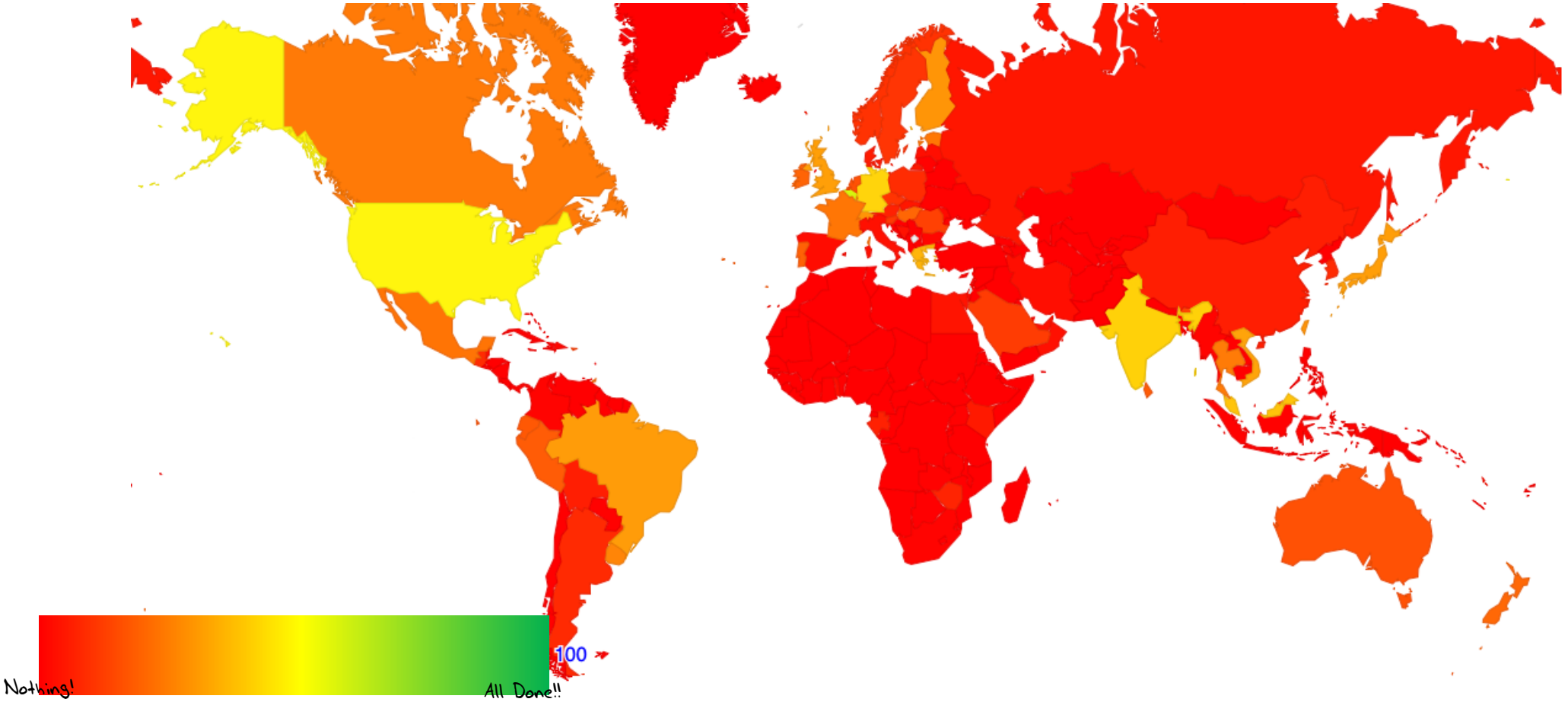
- Where is IPv6 Deployment activity?
- Where is IPv6 widely deployed today?
- Where are the most active areas of IPv6 growth?
- Have the disruptions of COVID-19 impacted the momentum of IPv6 deployment?

The Big Picture(s)

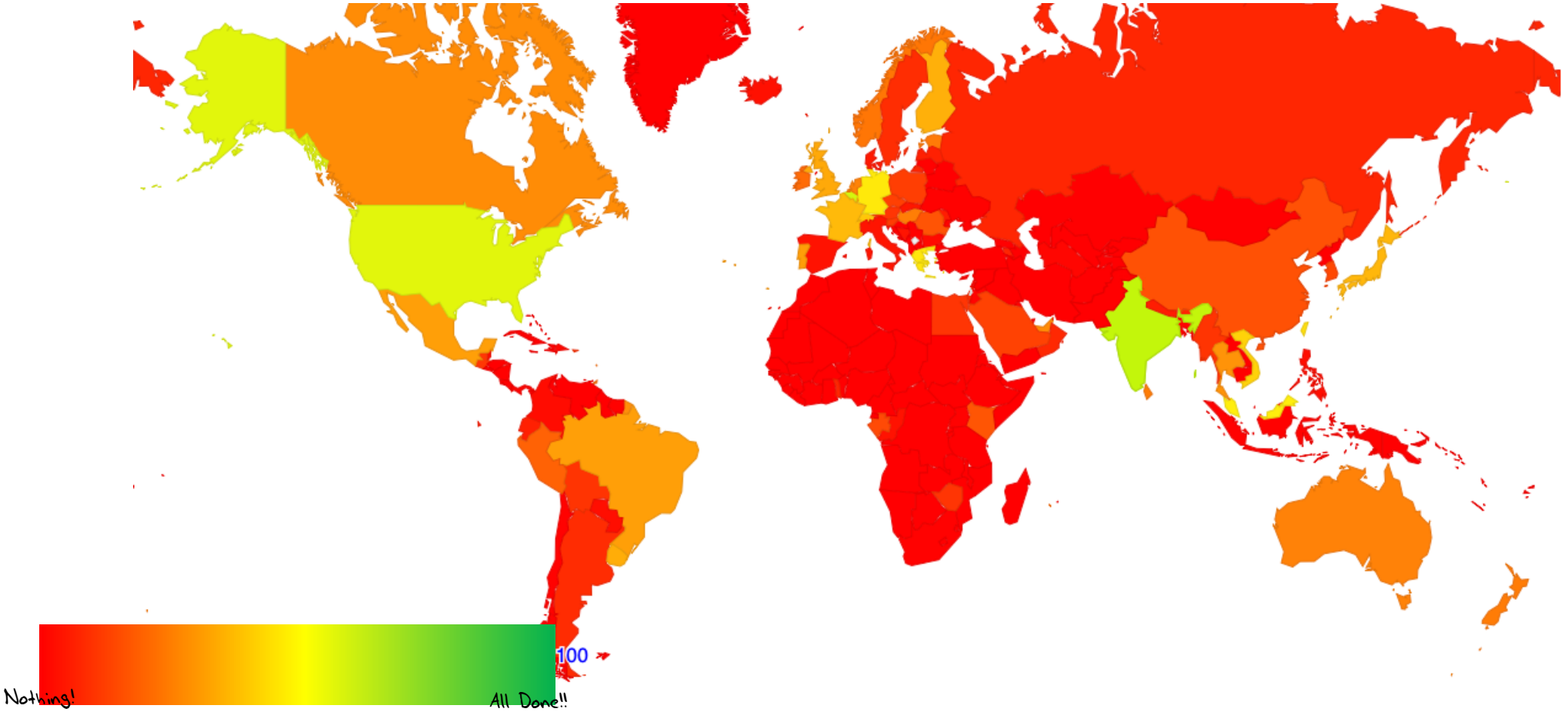
Use of IPv6 for World (XA)



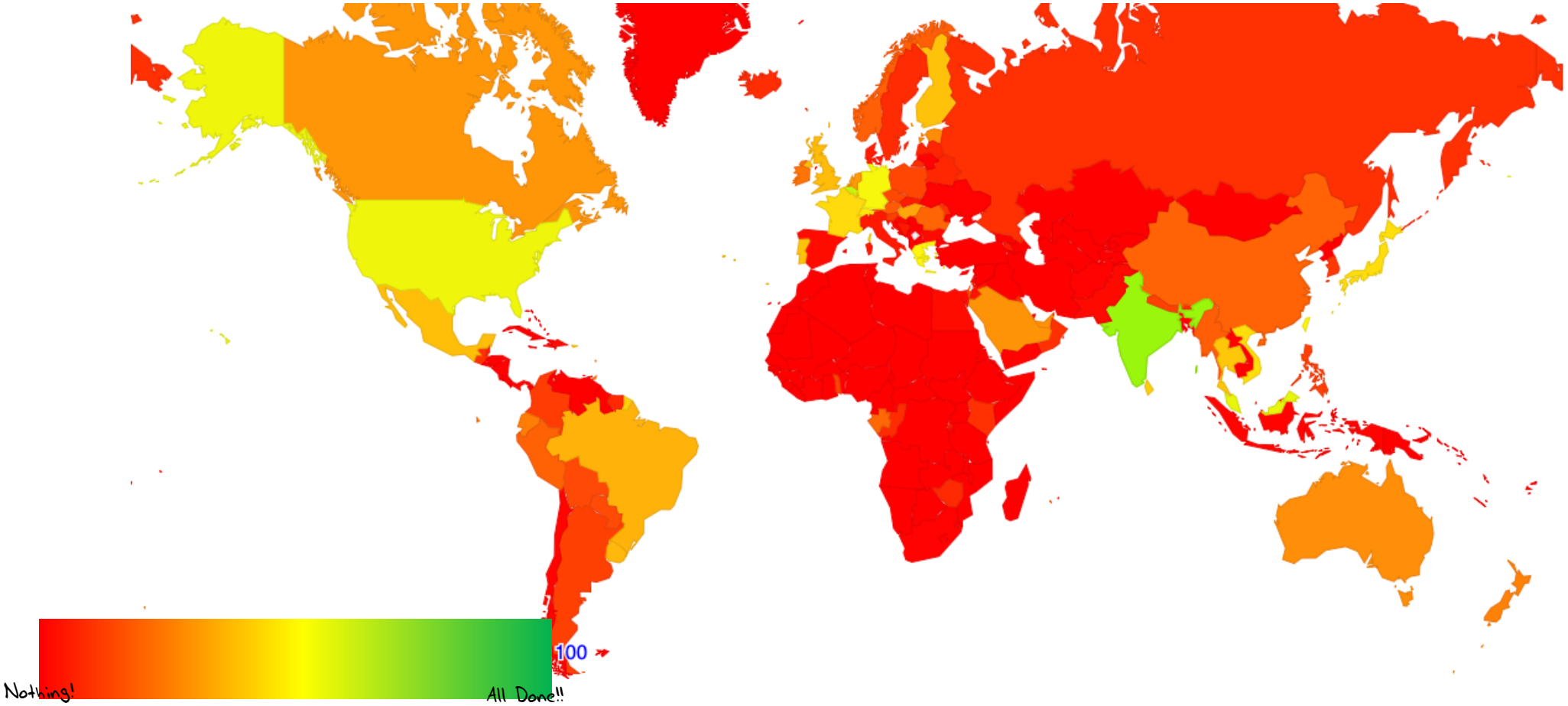
IPv6 - January 2019



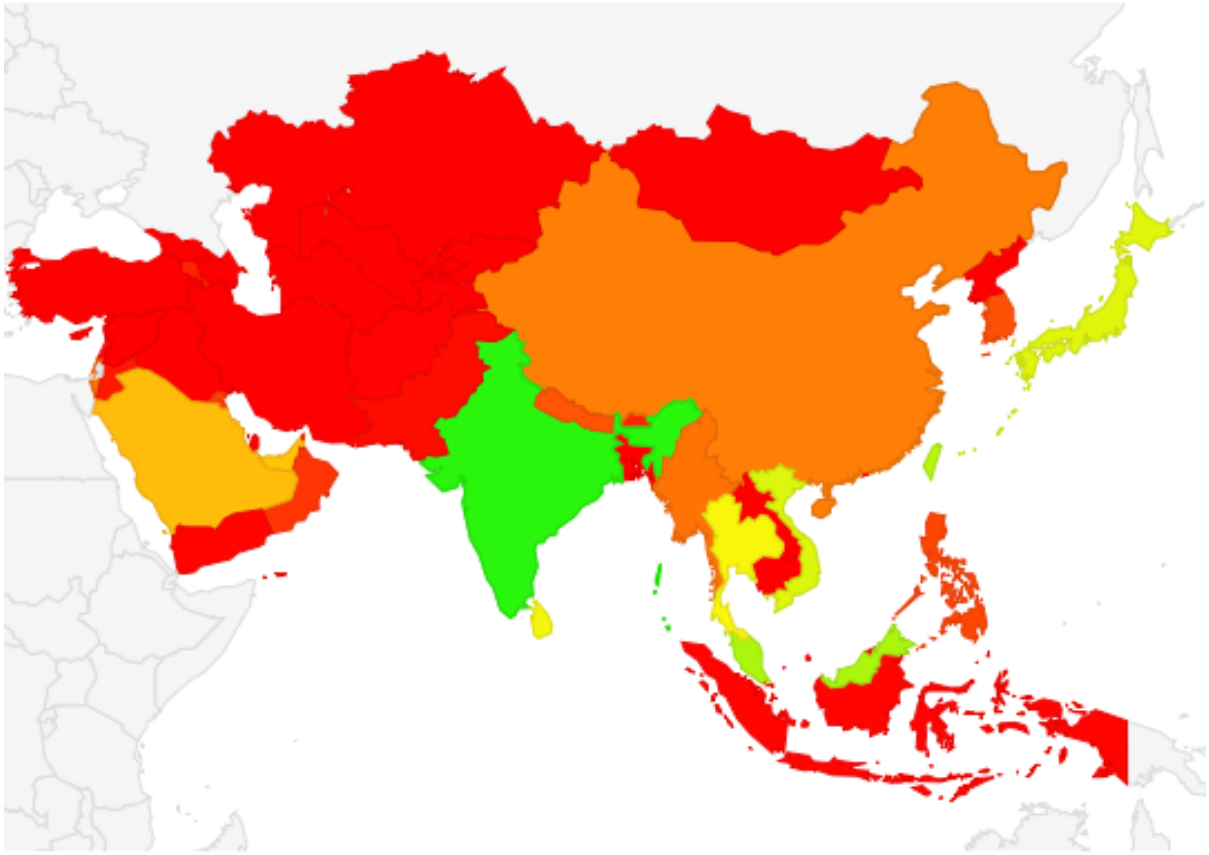
IPv6 - January 2020



IPv6- January 2021

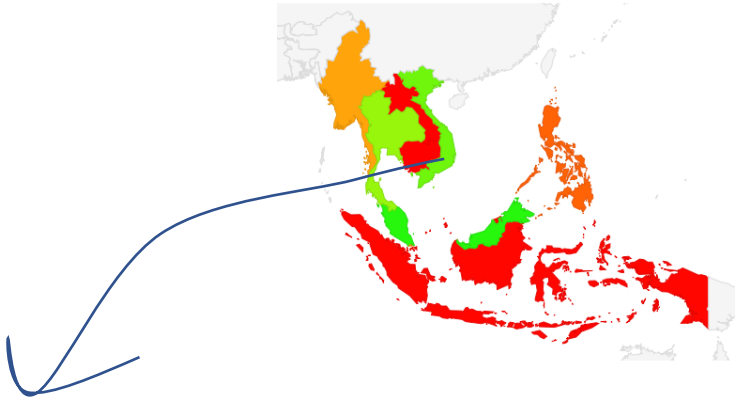


Let's Focus on Asia…

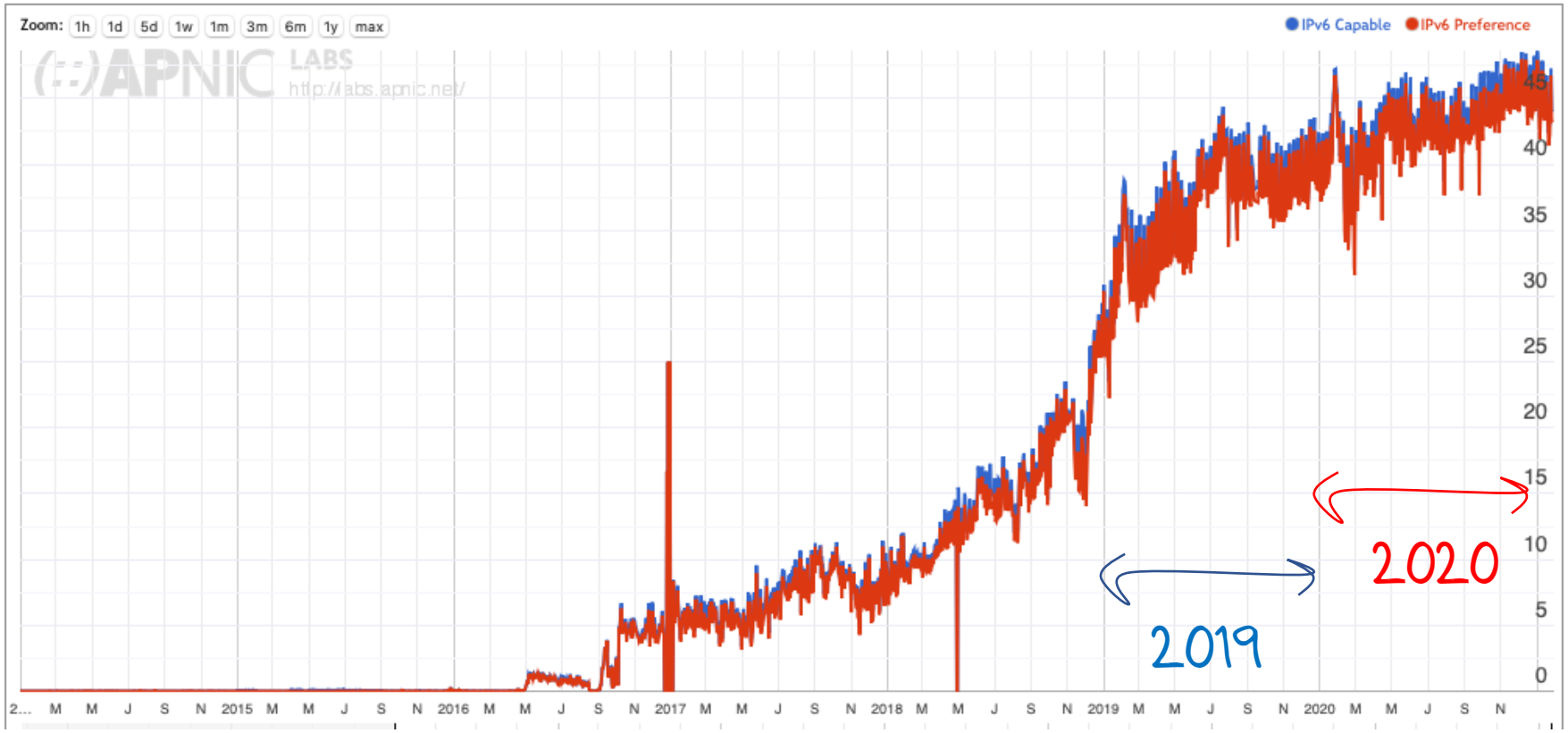


South East Asia

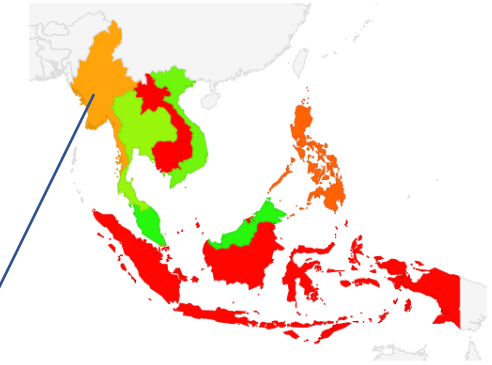
Vietnam



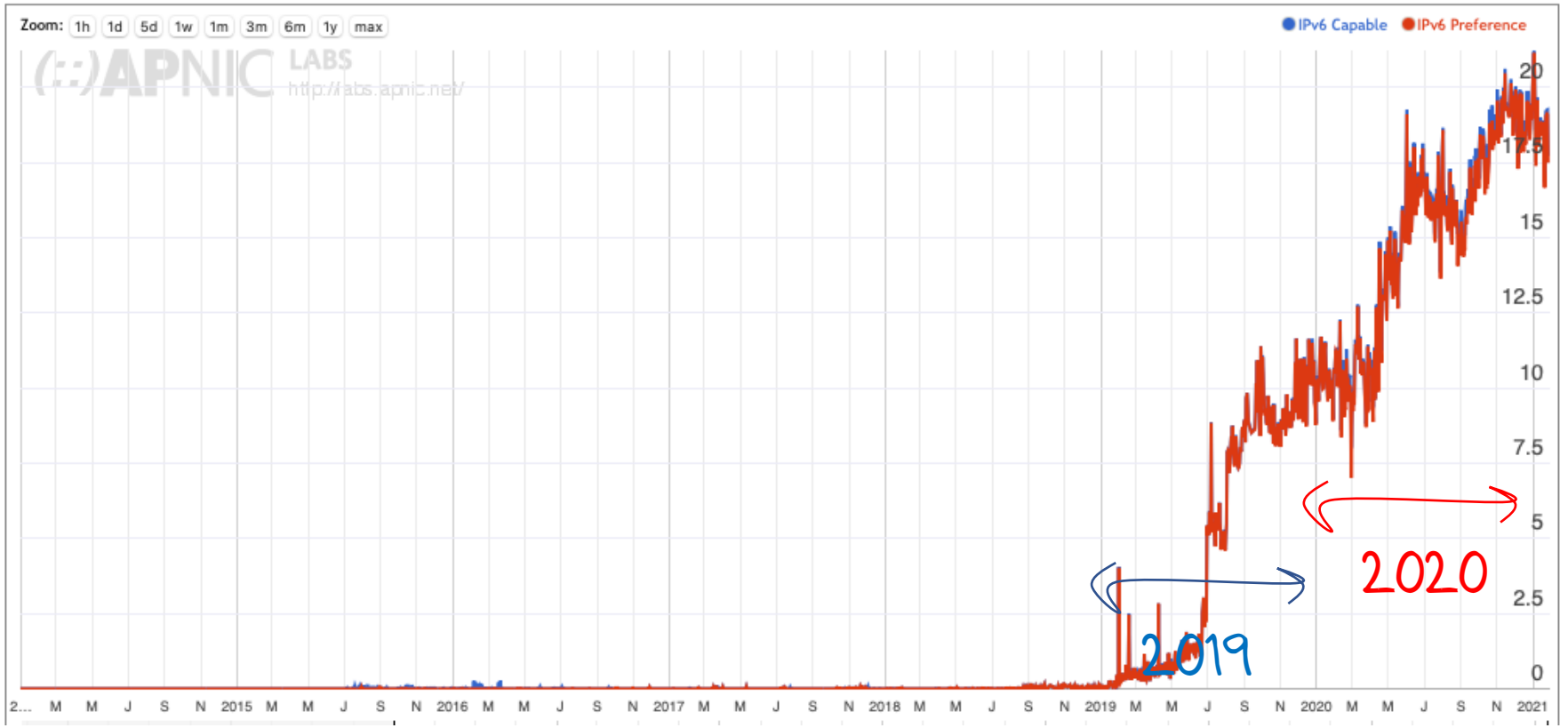
Use of IPv6 for Vietnam (VN)



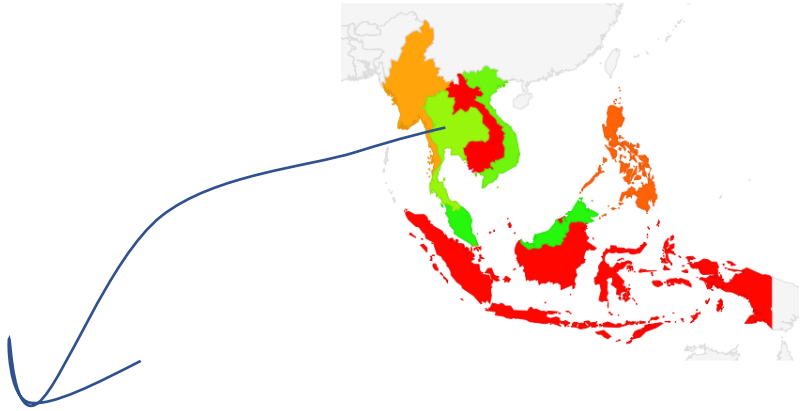
Myanmar



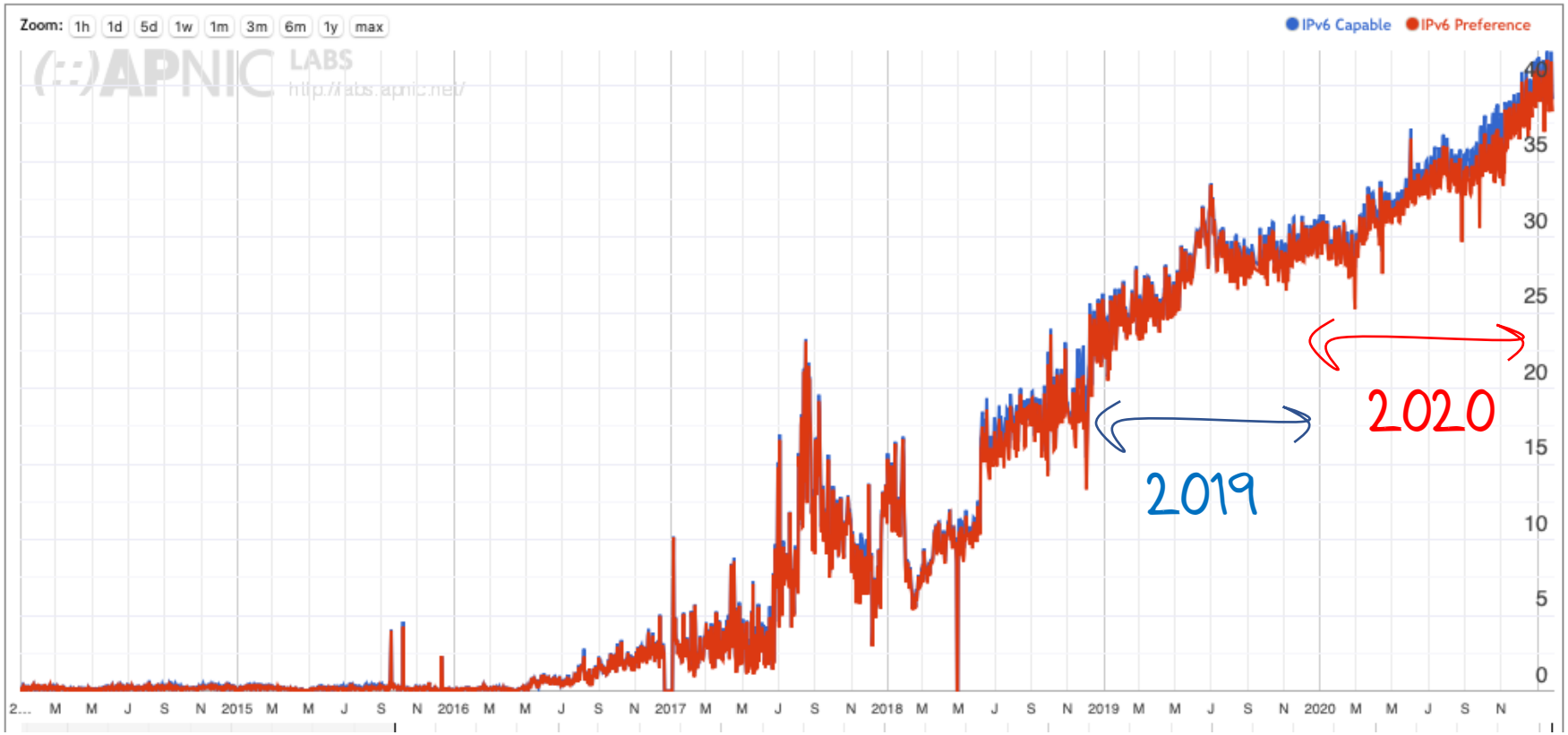
Use of IPv6 for Myanmar (MM)



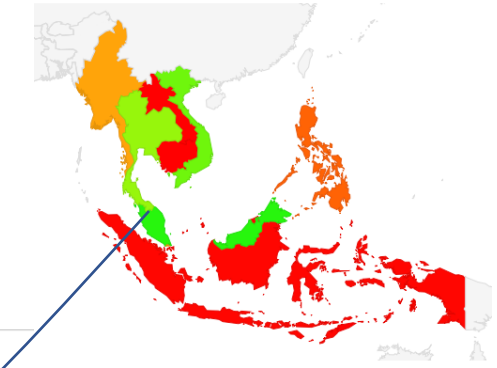
Thailand



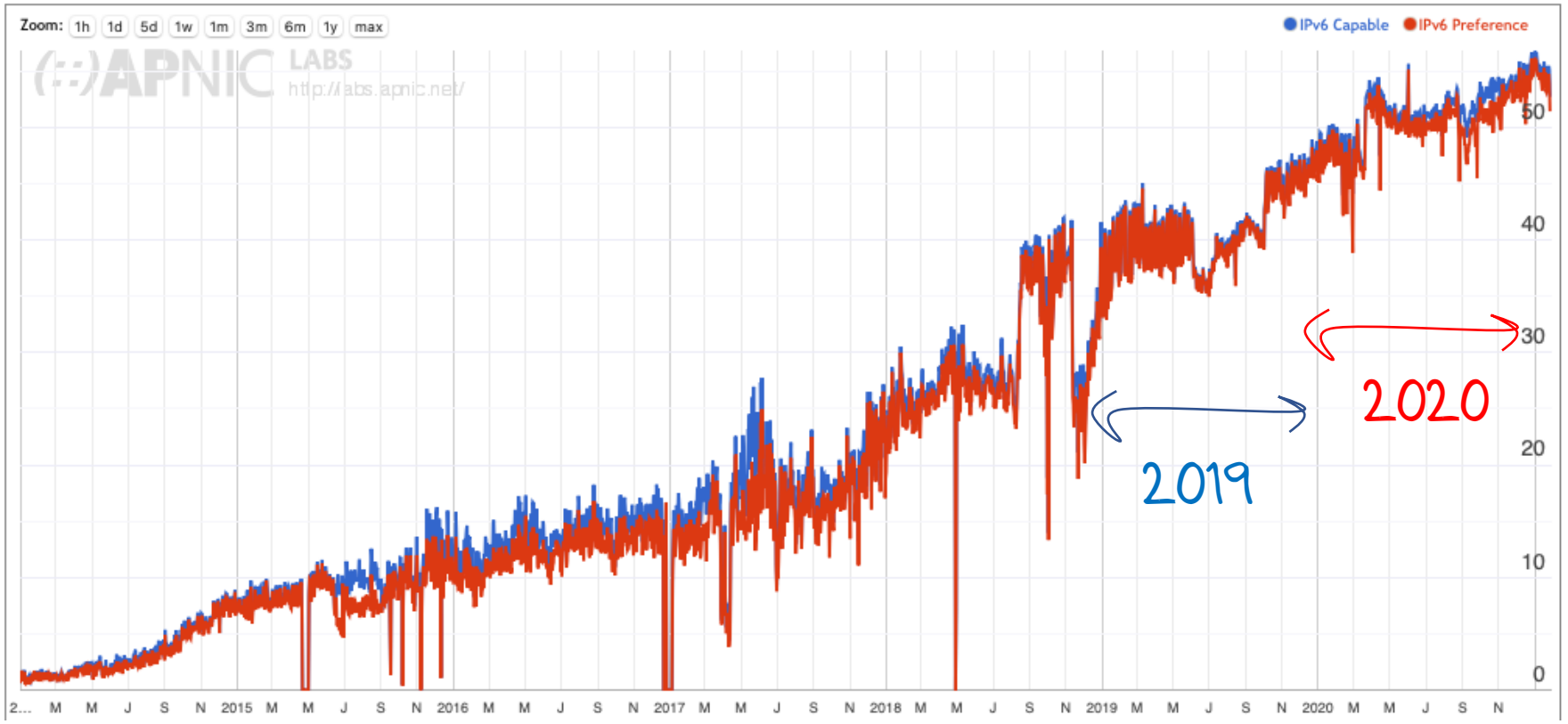
Use of IPv6 for Thailand (TH)



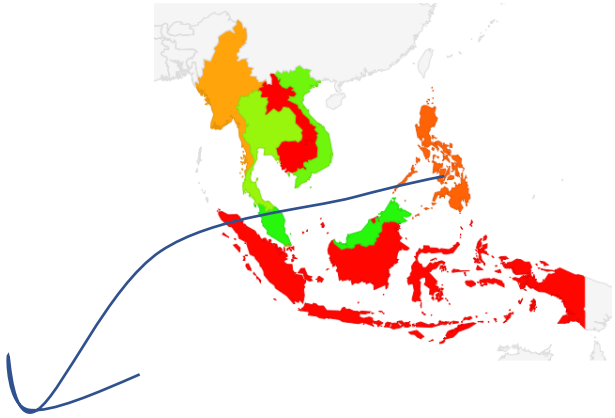
Malaysia



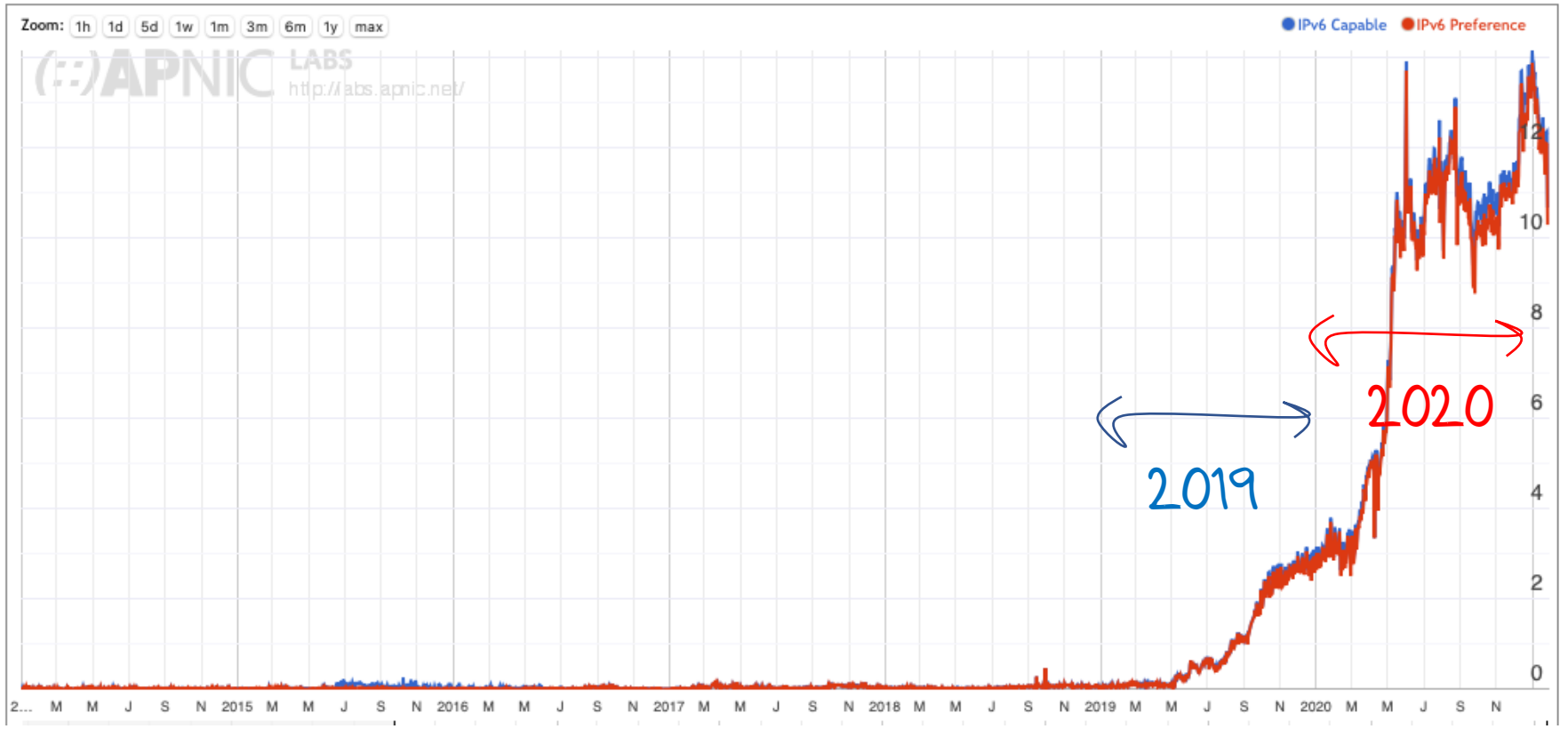
Use of IPv6 for Malaysia (MY)



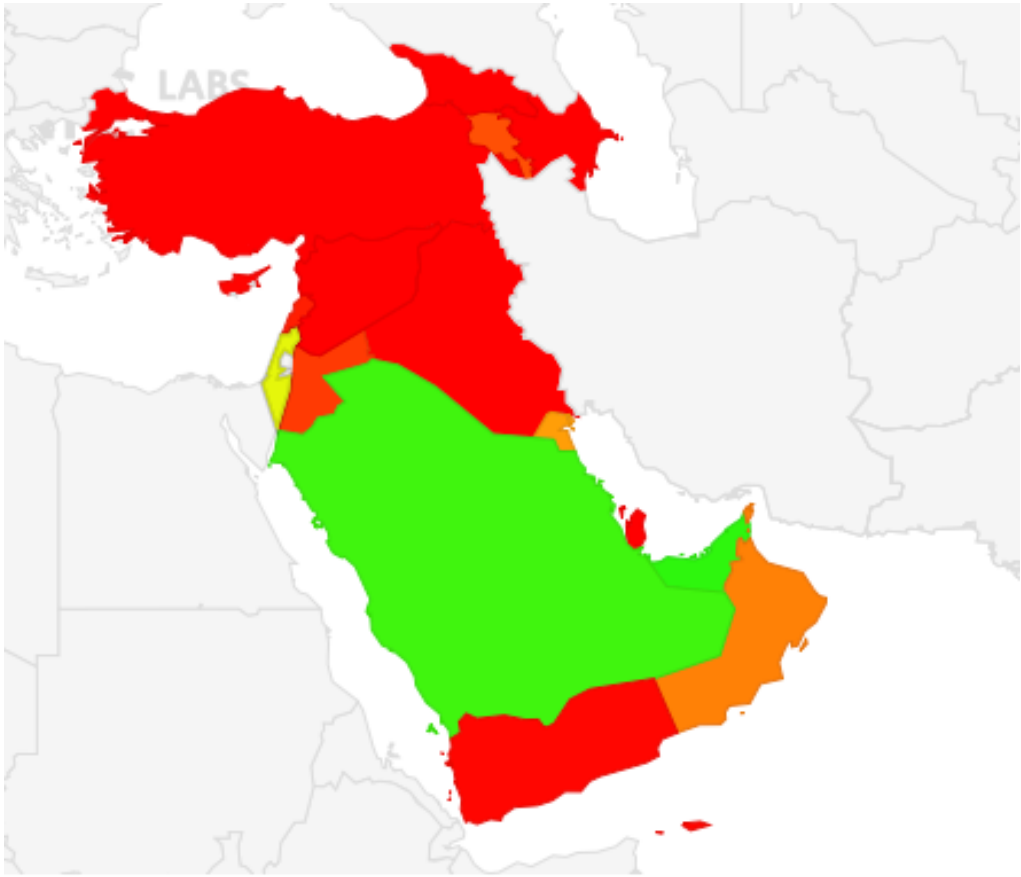
Philippines



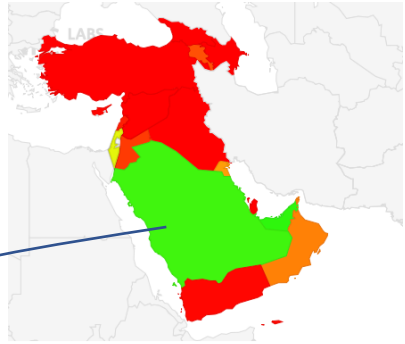
Use of IPv6 for Philippines (PH)



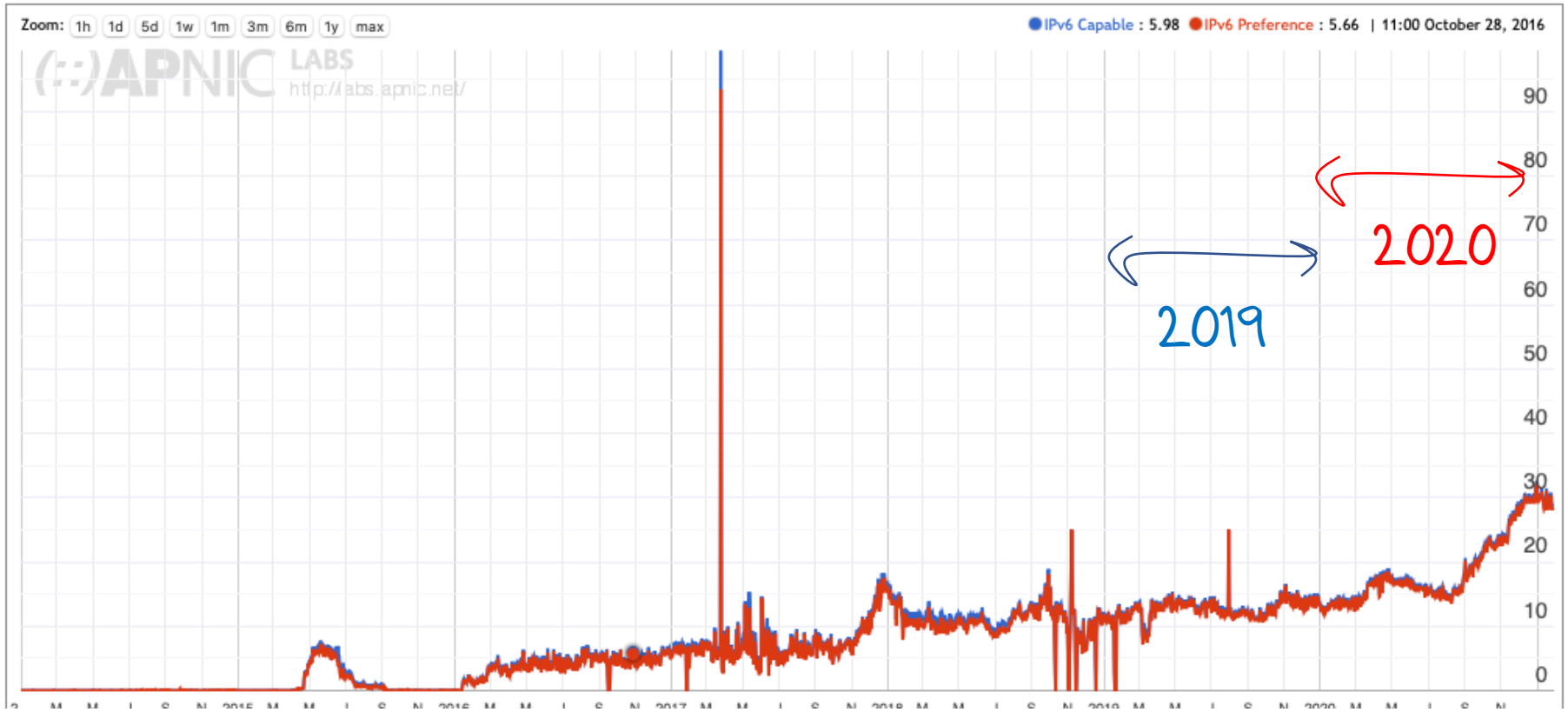
Western Asia / Middle East



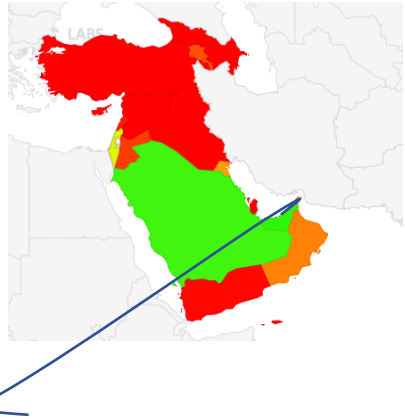
Saudi Arabia



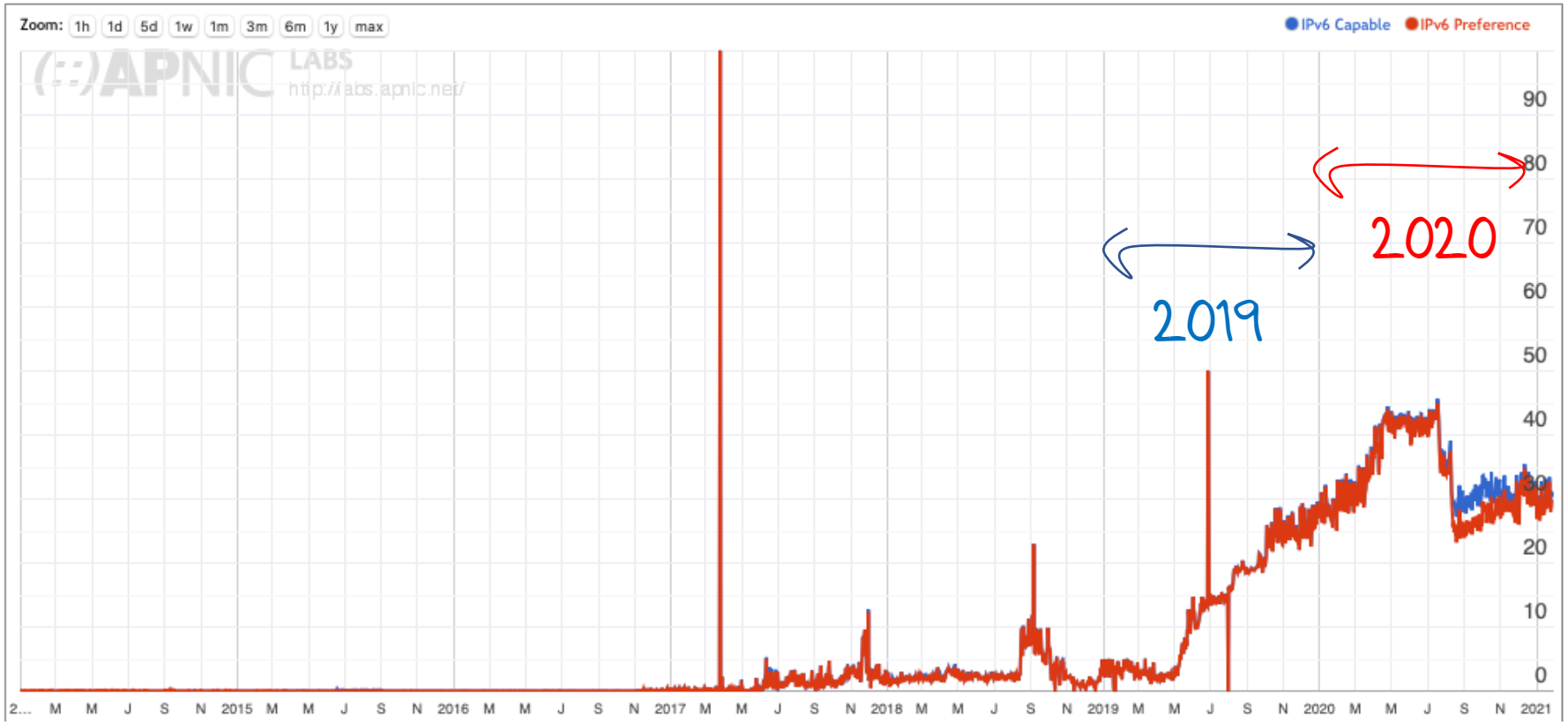
Use of IPv6 for Saudi Arabia (SA)



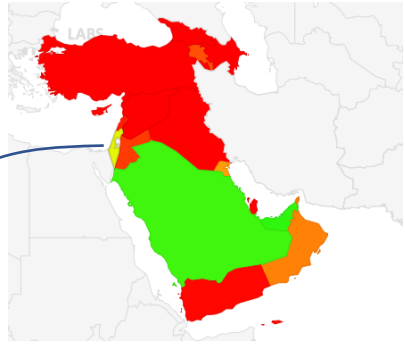
United Arab Emirates



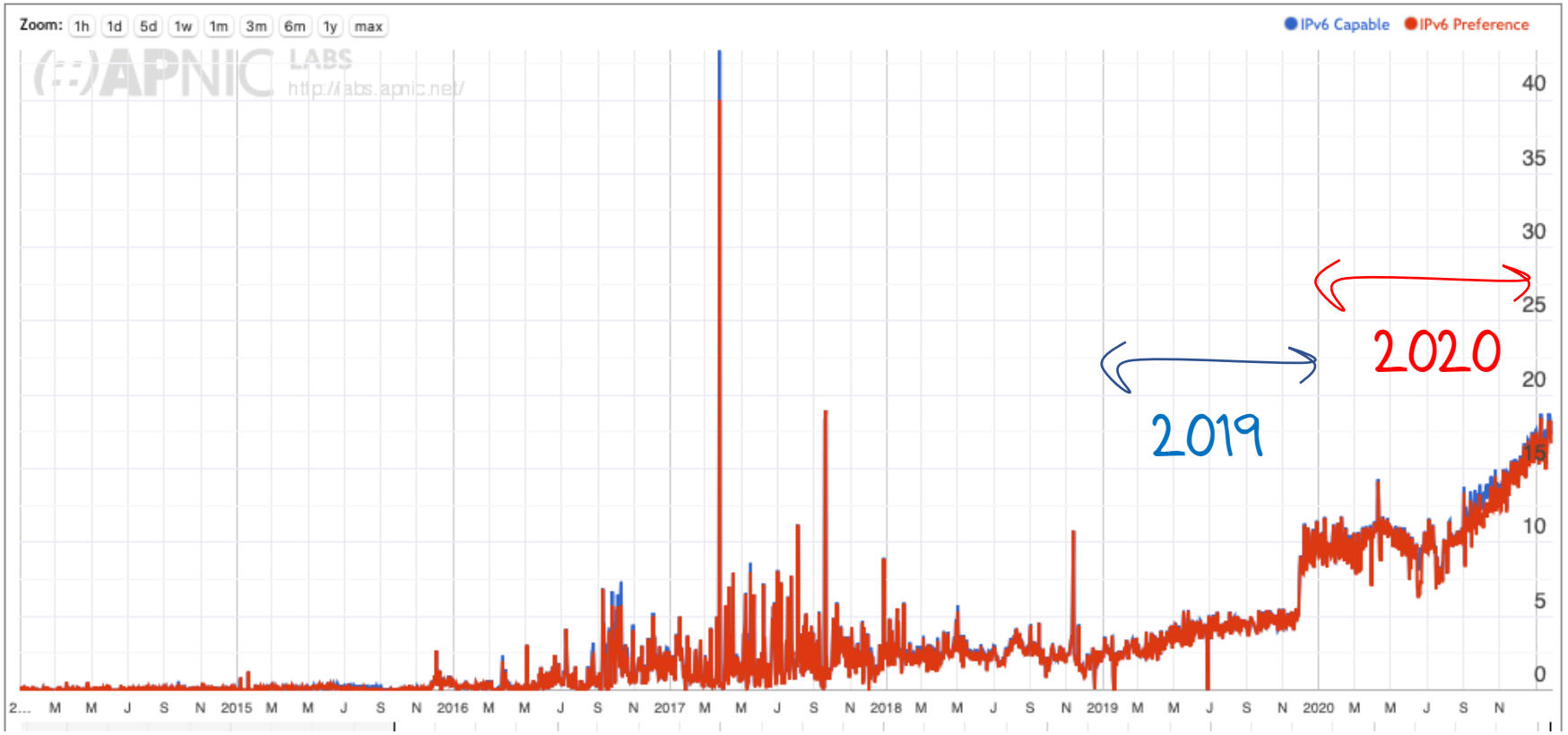
Use of IPv6 for United Arab Emirates (AE)



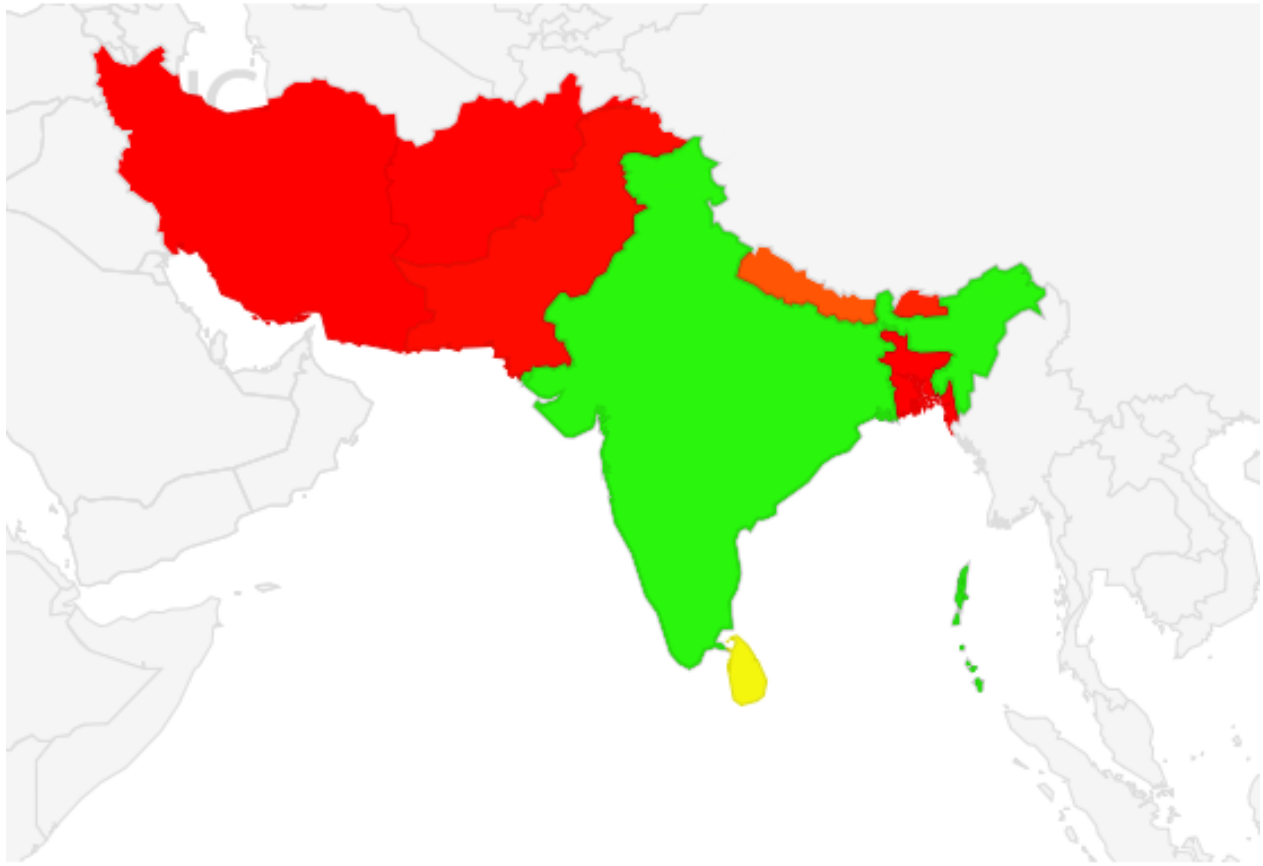
Israel



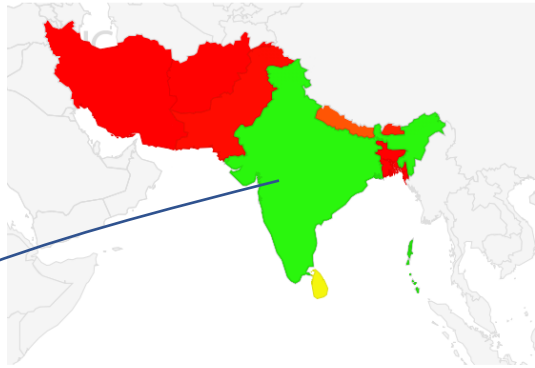
Use of IPv6 for Israel (IL)



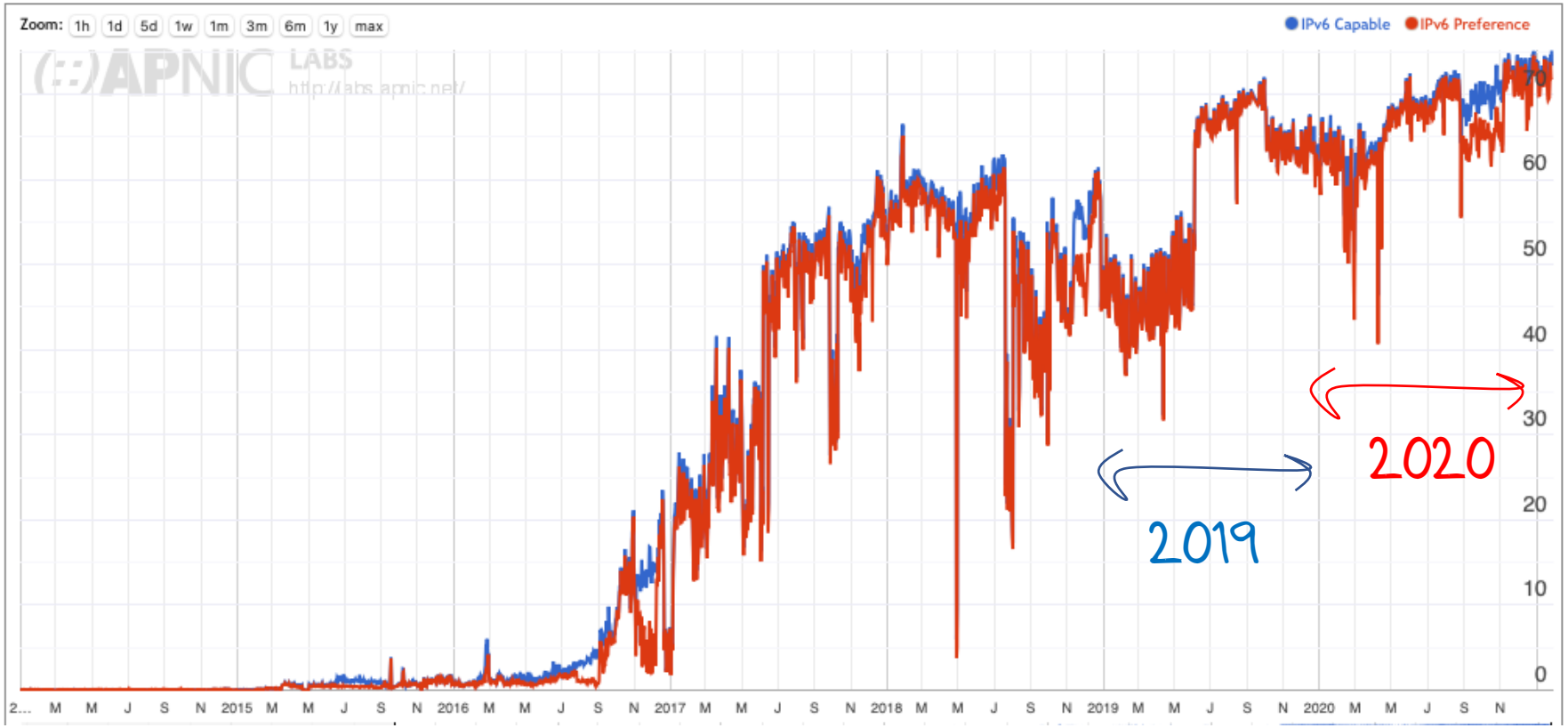
South Asia



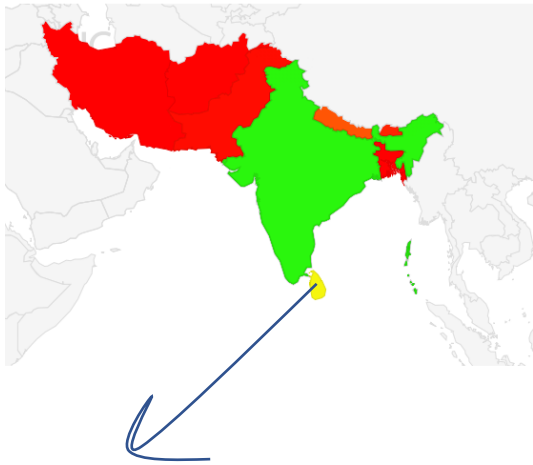
India



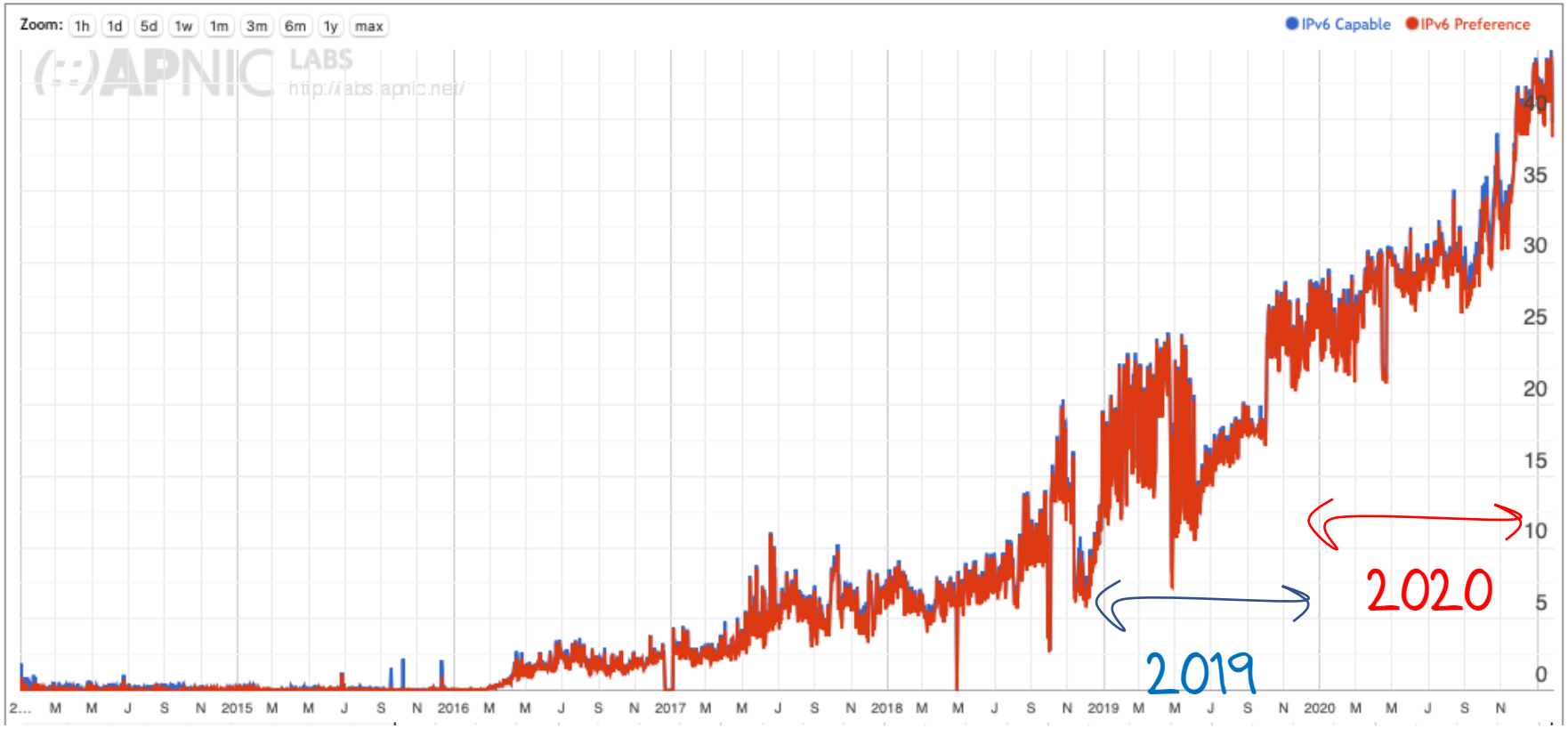
Use of IPv6 for India (IN)



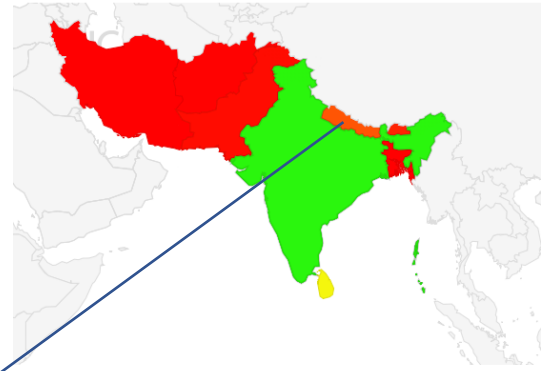
Sri Lanka



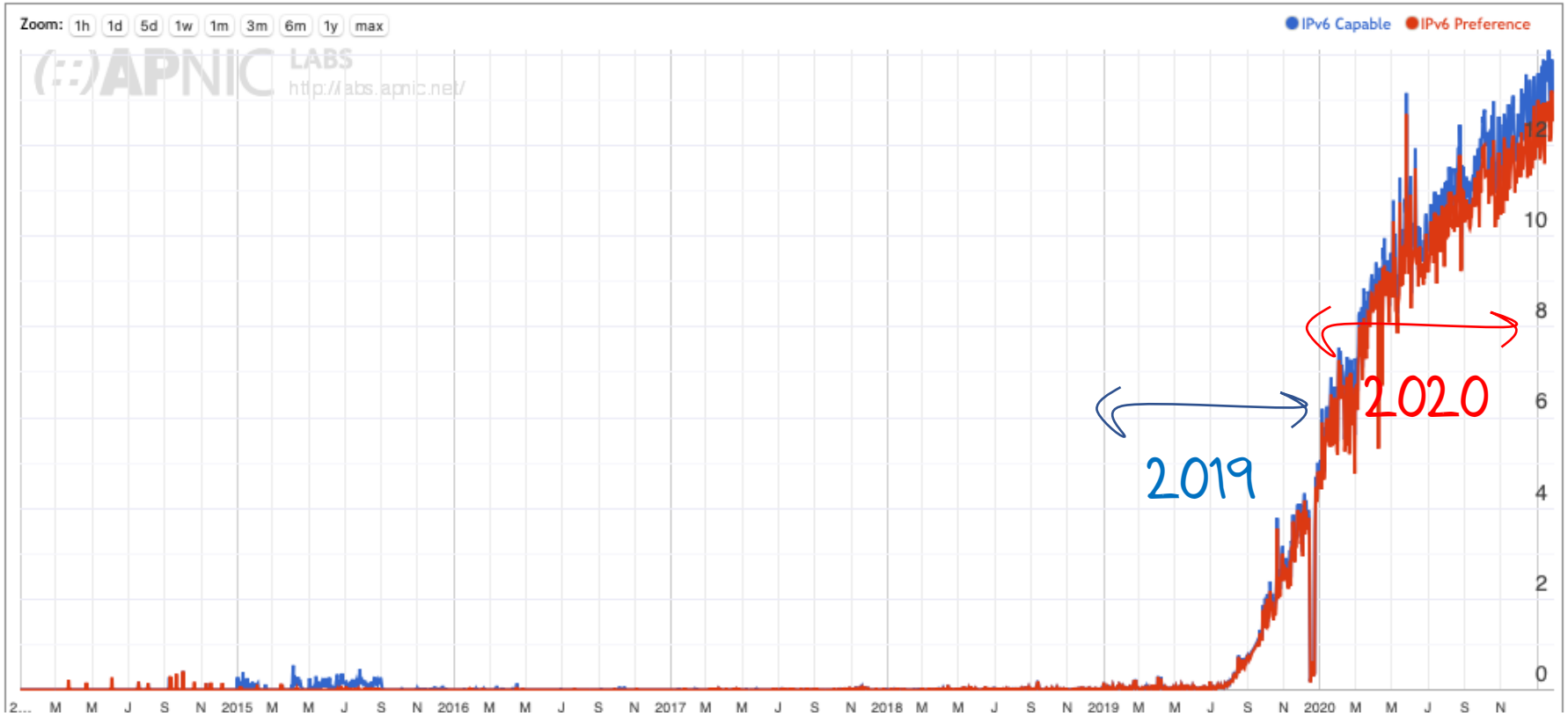
Use of IPv6 for Sri Lanka (LK)



Nepal

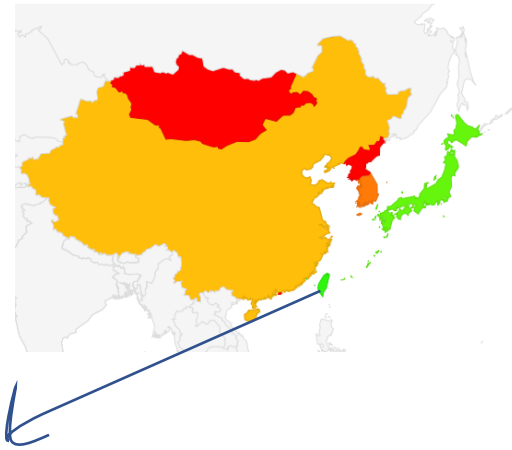


Use of IPv6 for Nepal (NP)

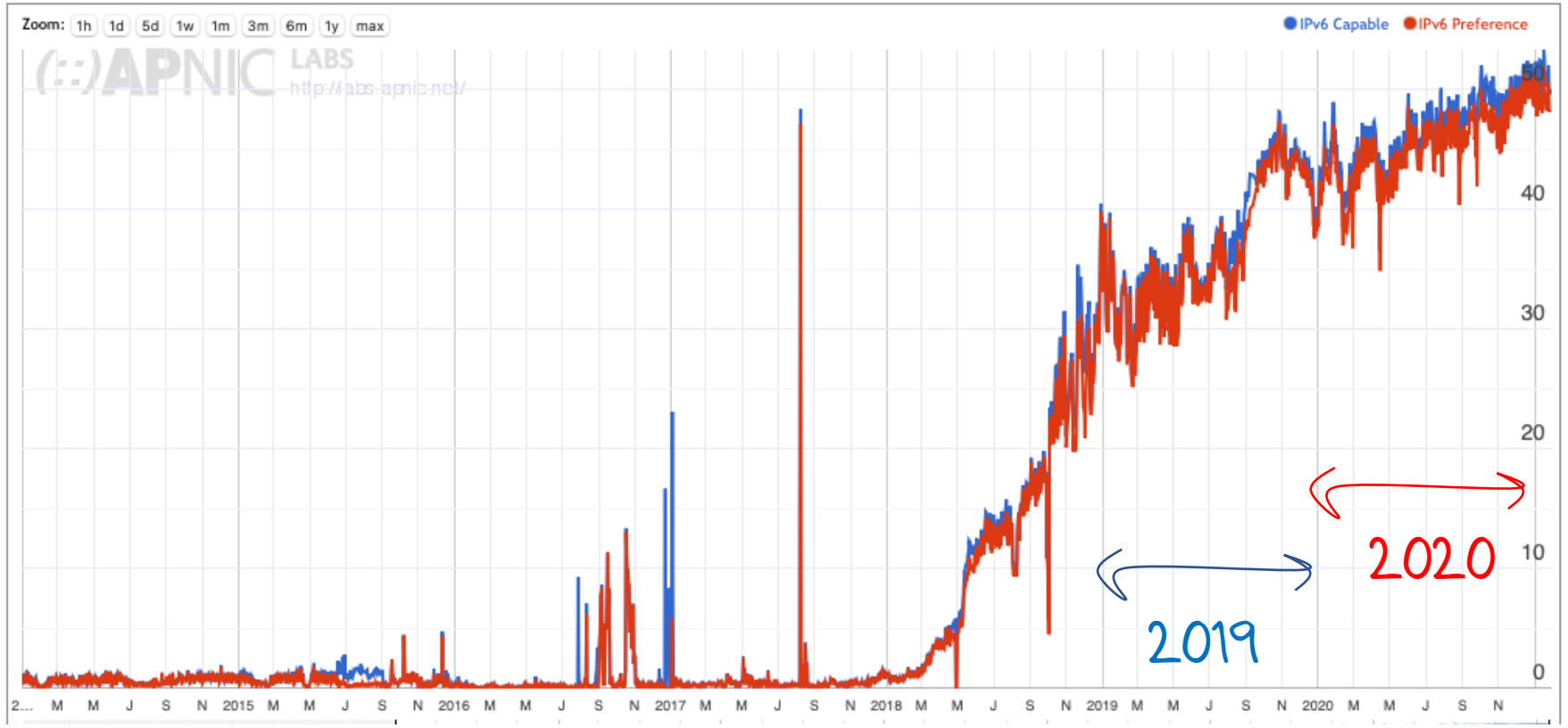


East Asia

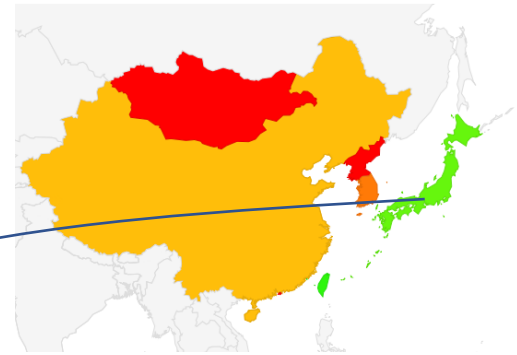
Taiwan



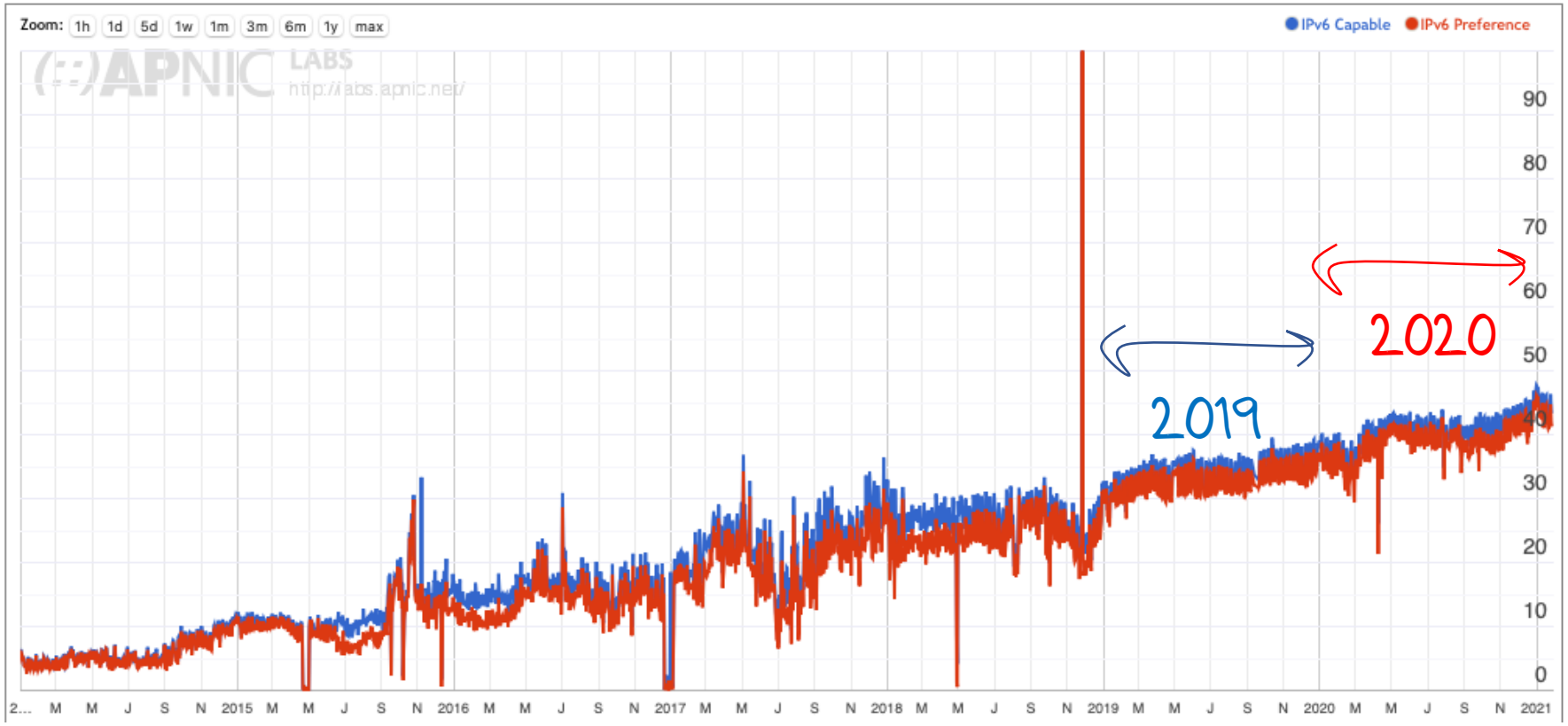
Use of IPv6 for Taiwan (TW)



Japan

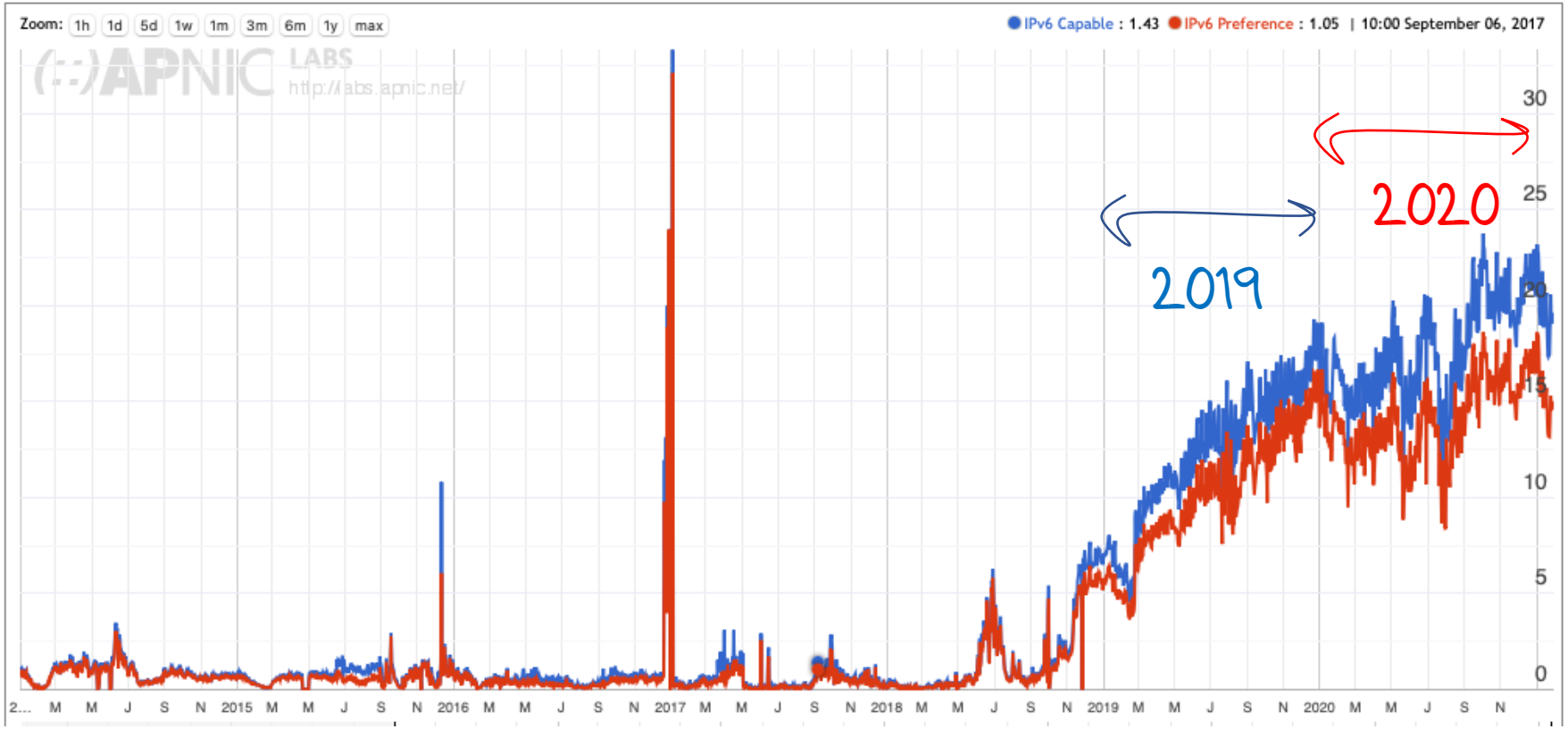


Use of IPv6 for Japan (JP)



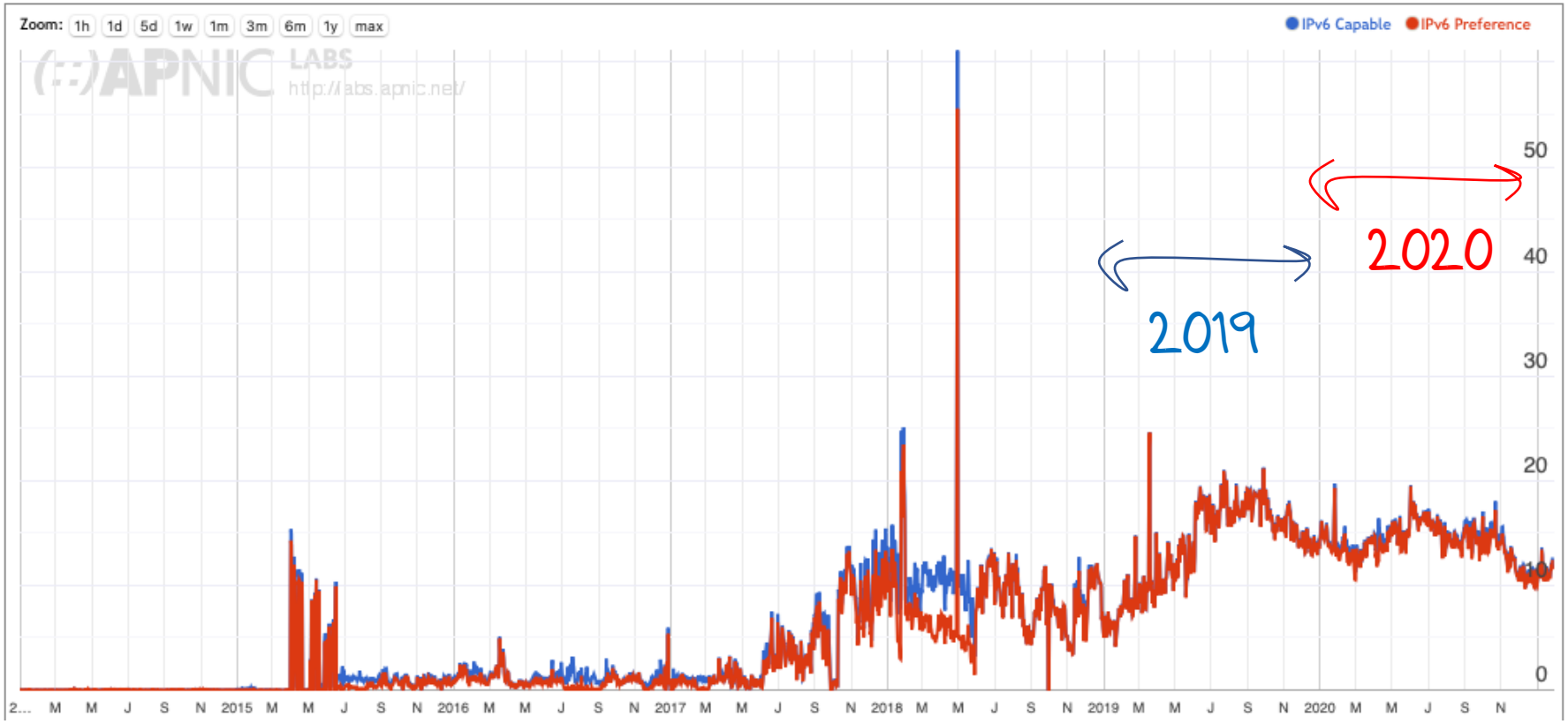
China

Use of IPv6 for China (CN)

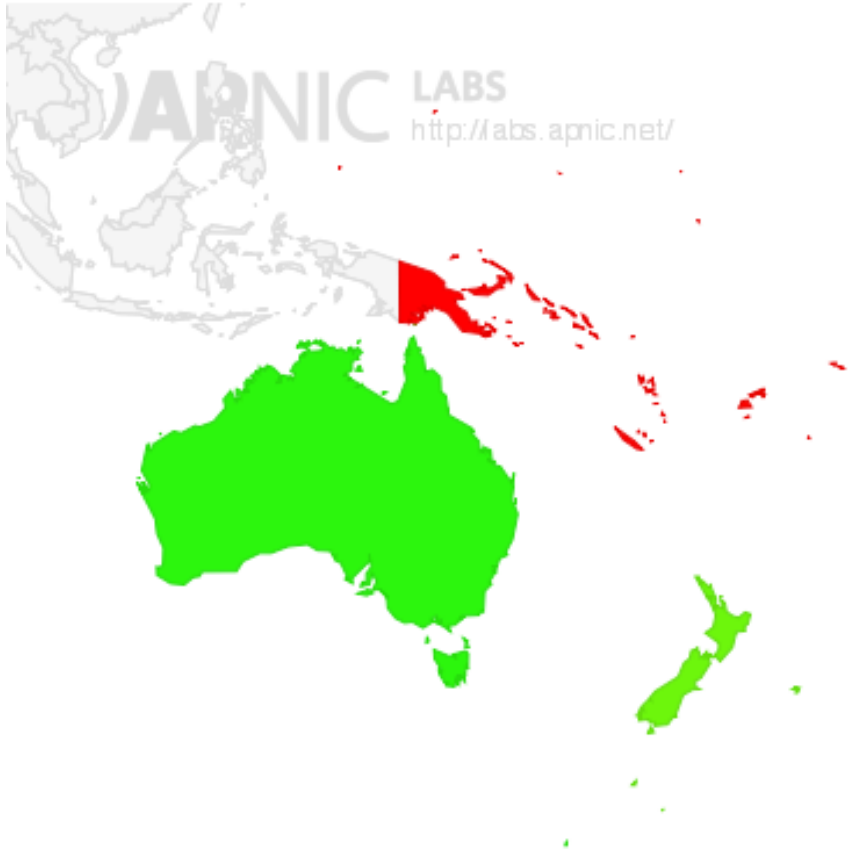


South Korea

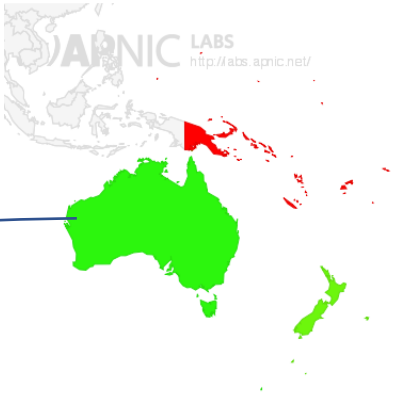
Use of IPv6 for Republic of Korea (KR)



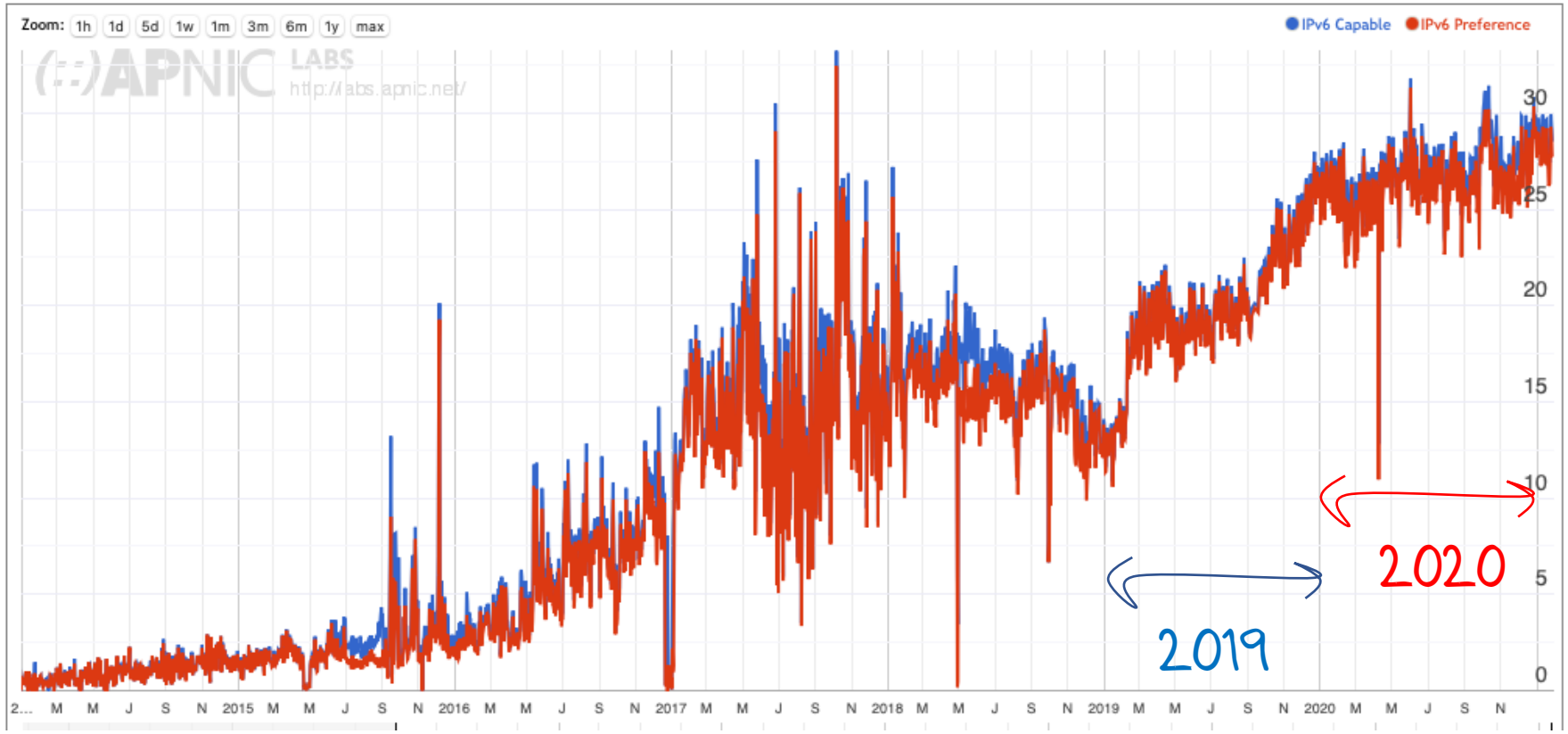
Oceania



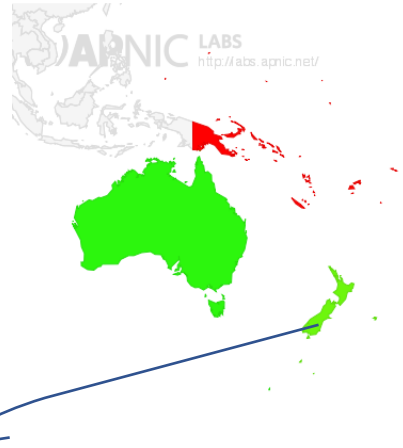
Australia



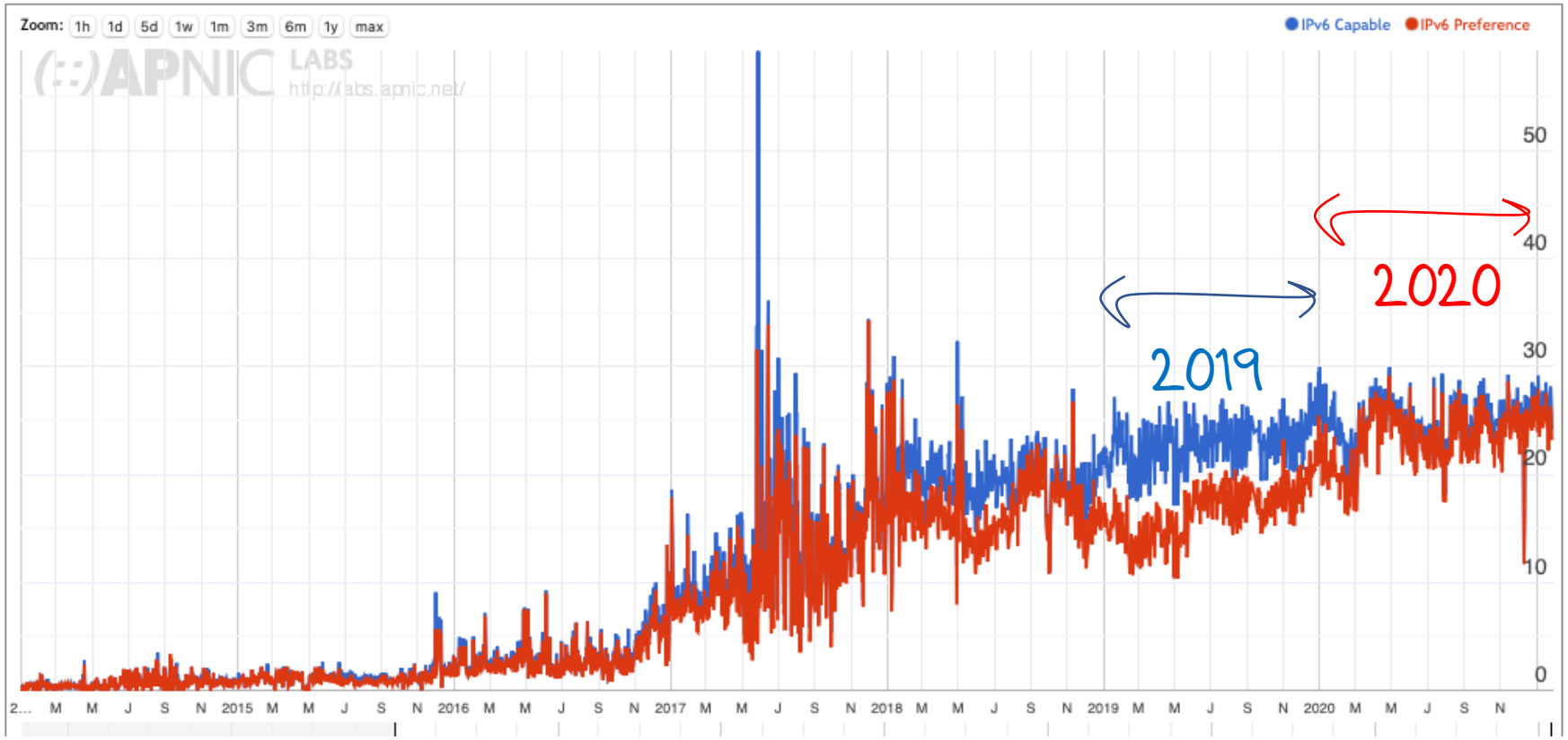
Use of IPv6 for Australia (AU)



New Zealand



Use of IPv6 for New Zealand (NZ)



Observations

- Global growth of IPv6 is much slower overall in 2020 as compared to 2019
  - 2019: 6% growth in users (18% to 24%)
  - 2020: 3% growth in users (24% to 27%)

- But, IPv6 growth has not slowed down in 2020 for many Asian economies

- Lets now look at some tables…

Greatest 24-Month Deployment Growth

- This is the change in the relative IPv6 capability for each economy from the start of 2019 to the start of 2021
- It's the change in % of users within each economy who have IPv6 comparing the start of 2019 to the start of 2021

1	YT	62.9	Mayotte
2	GF	42.2	French Guiana
3	LK	29.5	Sri Lanka
4	AE	29.0	United Arab Emirates
5	PR	28.6	Puerto Rico
6	MQ	24.5	Martinique
7	GP	24.0	Guadeloupe
8	PT	23.7	Portugal
9	FR	22.6	France
10	RE	21.3	Reunion
11	CH	20.8	Switzerland
12	MY	20.5	Malaysia
13	SA	20.0	Saudi Arabia
14	TW	19.4	Taiwan
15	IN	19.0	India
16	MM	18.8	Myanmar
17	NL	18.4	Netherlands
18	VN	17.9	Vietnam
19	GA	17.2	Gabon
20	GR	17.1	Greece
21	LU	16.3	Luxembourg
22	MX	16.0	Mexico
23	TH	15.9	Thailand
24	AU	15.3	Australia
25	HU	14.8	Hungary

% IPv6 Growth over the past 24 months

V6 deployment
January 2019

1	BL	83.3	Saint Barthelemy
2	IN	53.8	India
3	BE	52.4	Belgium
4	US	47.4	United States of America
5	EU	38.8	European Union
6	DE	37.7	Germany
7	MY	34.5	Malaysia
8	GR	33.4	Greece
9	TW	31.3	Taiwan
10	JP	29.8	Japan
11	BR	28.9	Brazil
12	GB	28.4	United Kingdom
13	UY	28.2	Uruguay
14	VN	27.8	Vietnam
15	FI	27.2	Finland
16	LU	26.4	Luxembourg
17	CH	25.9	Switzerland
18	TH	24.1	Thailand
19	CA	23.6	Canada
20	MX	22.8	Mexico

V6 deployment
January 2020

1	YT	66.6	Mayotte
2	IN	63.7	India
3	BE	60.4	Belgium
4	US	55.8	United States of America
5	MY	47.4	Malaysia
6	DE	47.3	Germany
7	GR	47.2	Greece
8	TW	43.9	Taiwan
9	MF	41.9	Saint Martin (FR)
10	VN	41.0	Vietnam
11	BL	40.5	Saint Barthelemy
12	CH	40.3	Switzerland
13	FR	38.3	France
14	JP	36.5	Japan
15	LU	36.2	Luxembourg
16	FI	34.8	Finland
17	UY	34.6	Uruguay
18	GB	34.0	United Kingdom
19	GF	32.8	French Guiana
20	PT	32.4	Portugal

V6 deployment
January 2021

1	IN	72.8	India
2	YT	62.9	Mayotte
3	BE	62.9	Belgium
4	BL	58.1	Saint Barthelemy
5	MY	55.0	Malaysia
6	US	52.8	United States of America
7	TW	50.7	Taiwan
8	GR	50.5	Greece
9	DE	50.4	Germany
10	CH	46.7	Switzerland
11	VN	45.7	Vietnam
12	JP	44.3	Japan
13	FR	43.8	France
14	LU	42.7	Luxembourg
15	GF	42.2	French Guiana
16	LK	41.7	Sri Lanka
17	PR	41.0	Puerto Rico
18	TH	40.0	Thailand
19	PT	39.6	Portugal
20	MX	38.8	Mexico

24-month User Growth

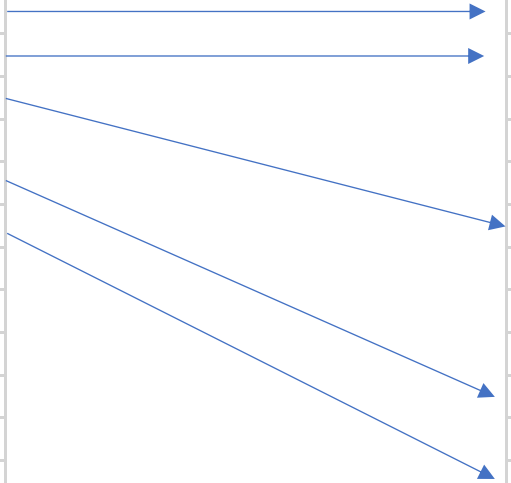
- Percentages only tell part of the story
- We can convert percentages to estimates of IPv6 users per economy
- Over the past 24 months some 470M users were connected with IPv6
- The bulk of this IPv6 user growth is in India and China, with a further 380M IPv6 users

1	IN	161,568,317	India
2	CN	118,082,098	China
3	MX	21,193,448	Mexico
4	BR	17,745,200	Brazil
5	JP	15,836,329	Japan
6	FR	11,557,854	France
7	TH	10,430,694	Thailand
8	VN	10,146,466	Vietnam
9	PH	9,159,114	Philippines
10	RU	8,357,617	Russian Federation
11	DE	8,276,402	Germany
12	MY	7,528,603	Malaysia
13	SA	7,437,879	Saudi Arabia
14	TW	7,038,298	Taiwan
15	GB	6,755,156	United Kingdom
16	MM	3,944,296	Myanmar
17	CO	3,827,137	Colombia
18	AU	3,535,571	Australia
19	CA	3,161,705	Canada
20	NL	3,042,160	Netherlands
21	AE	2,860,177	United Arab Emirates
22	LK	2,580,194	Sri Lanka
23	AR	2,569,302	Argentina
24	CH	2,069,825	Switzerland
25	PT	2,065,010	Portugal

User Growth - 2019 compared to 2020

Annual IPv6 User Growth 2019

2019			
1	IN	116,325,484	India
2	CN	86,940,479	China
3	MX	15,327,609	Mexico
4	BR	11,675,636	Brazil
5	FR	8,639,833	France
6	VN	7,886,964	Vietnam
7	JP	6,871,182	Japan
8	TH	6,194,110	Thailand
9	DE	6,054,944	Germany
10	RU	6,031,053	Russian Federation
11	MY	5,527,902	Malaysia
12	TW	5,468,095	Taiwan
13	EG	4,598,096	Egypt
14	GB	4,535,566	United Kingdom
15	KR	3,702,037	Republic of Korea
16	AU	2,983,059	Australia
17	AE	2,555,954	United Arab Emirates
18	CA	2,301,239	Canada
19	SA	2,248,138	Saudi Arabia
20	MM	2,218,934	Myanmar
		332,426,386	TOTAL



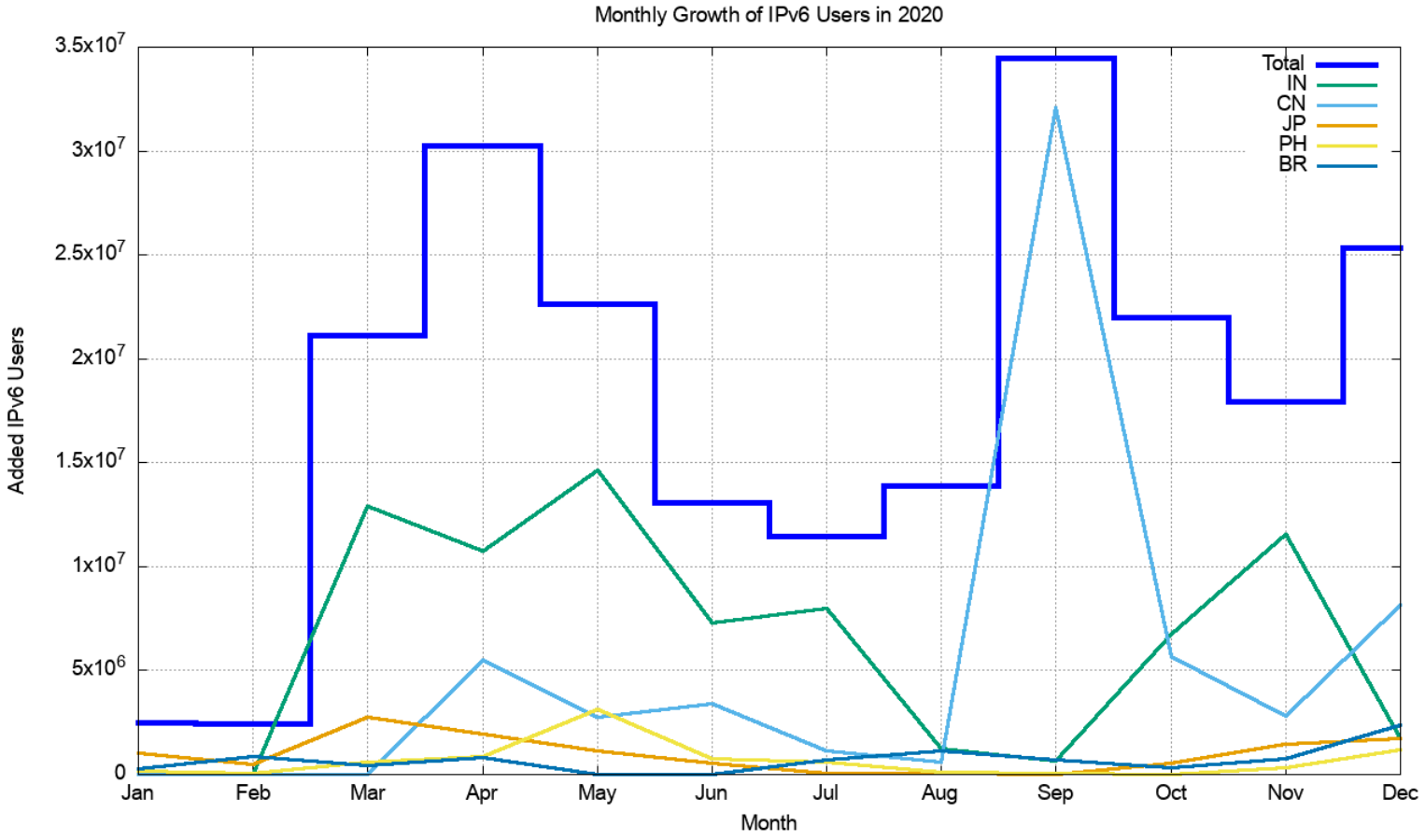
Annual IPv6 User Growth 2020

2020			
1	IN	45,242,832	India
2	CN	31,141,618	China
3	JP	8,965,146	Japan
4	PH	7,025,651	Philippines
5	BR	6,069,563	Brazil
6	MX	5,865,839	Mexico
7	SA	5,189,741	Saudi Arabia
8	TH	4,236,583	Thailand
9	CO	3,364,356	Colombia
10	FR	2,918,021	France
11	RU	2,326,564	Russian Federation
12	VN	2,259,501	Vietnam
13	DE	2,221,458	Germany
14	GB	2,219,589	United Kingdom
15	MY	2,000,701	Malaysia
16	EC	1,805,800	Ecuador
17	MM	1,725,361	Myanmar
18	TW	1,570,202	Taiwan
19	AR	1,527,311	Argentina
20	LK	1,282,057	Sri Lanka
		137,997,495	TOTAL

COVID-19 Impact?

- The number of IPv6-enabled users added in 2020 is half that of 2019
  - 332M added in 2019 and 132M added in 2020
- Most regions and economies saw a similar decline in IPv6 growth in user numbers
- What does a monthly view of 2020 show?

2020 Monthly view of Growth of IPv6 Users

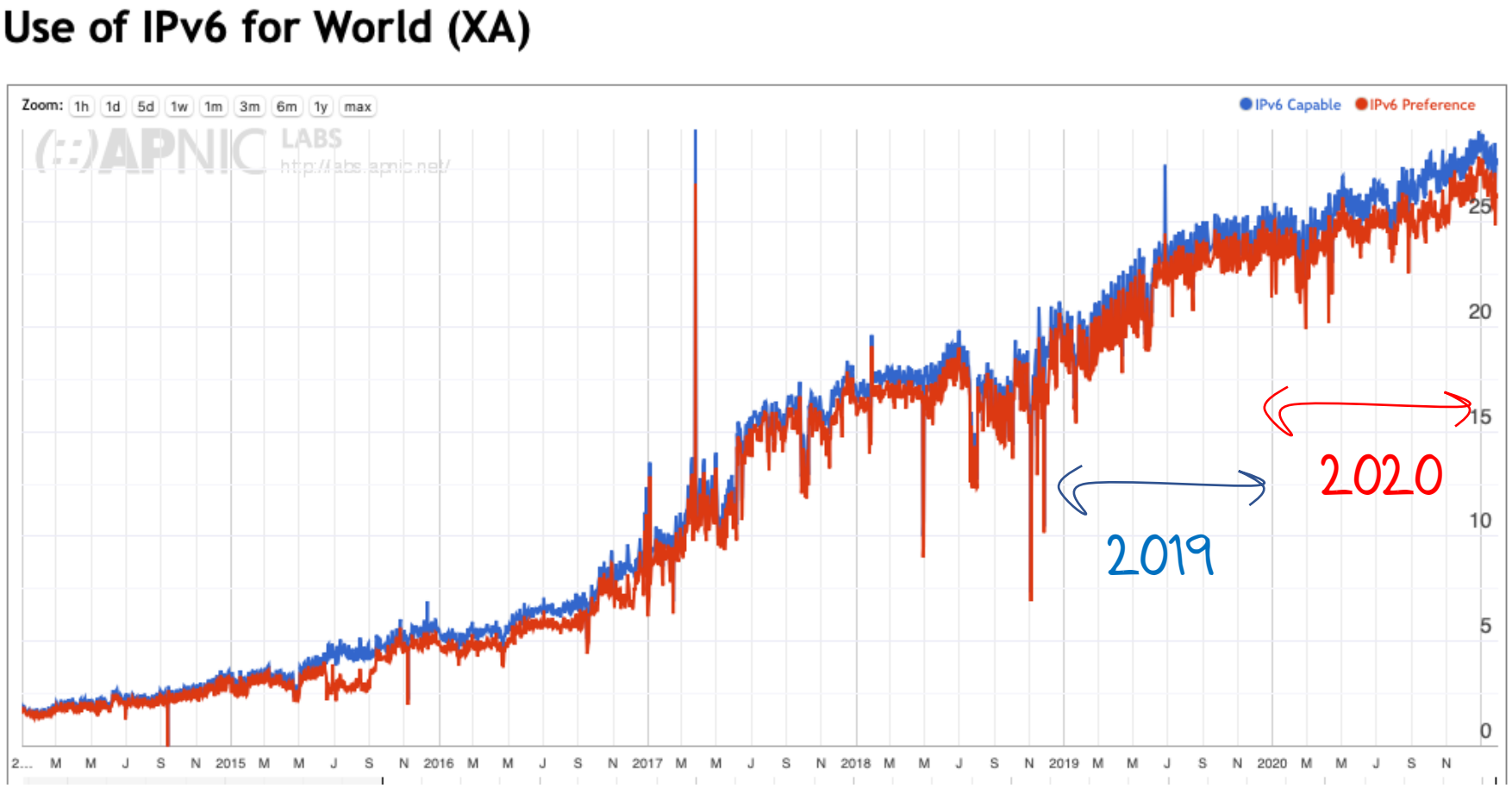


This figure shows the month-by-month growth in IPv6 users – mid-year saw a pause in IPv6 growth for the global Internet which is likely to be related to national COVID-19 lockdowns

For the 5 largest per-economy IPv6 user counts for 2020:

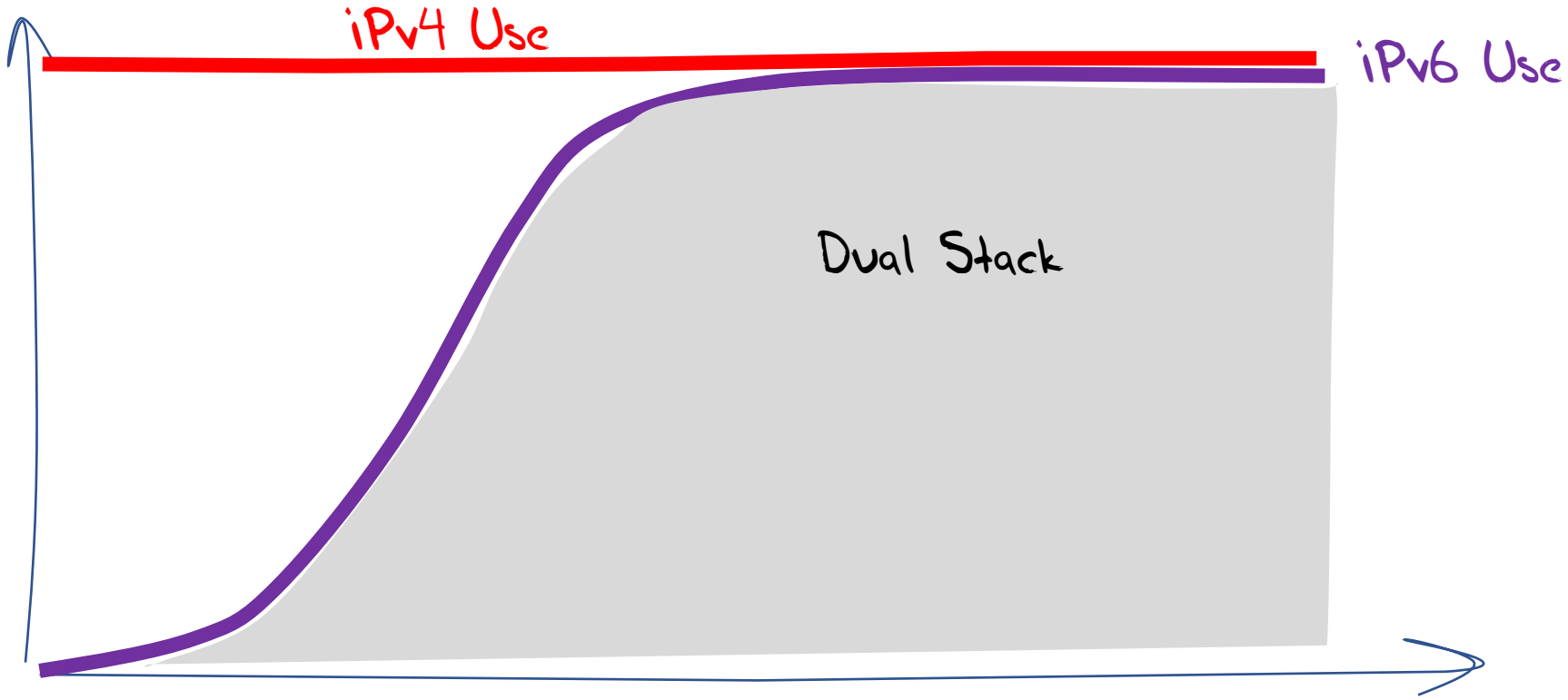
- India had a major deployment in March through May and November
- China resumed IPv6 deployment in August and September
- Brazil appears to have moved in November

Back to that Bigger Picture…



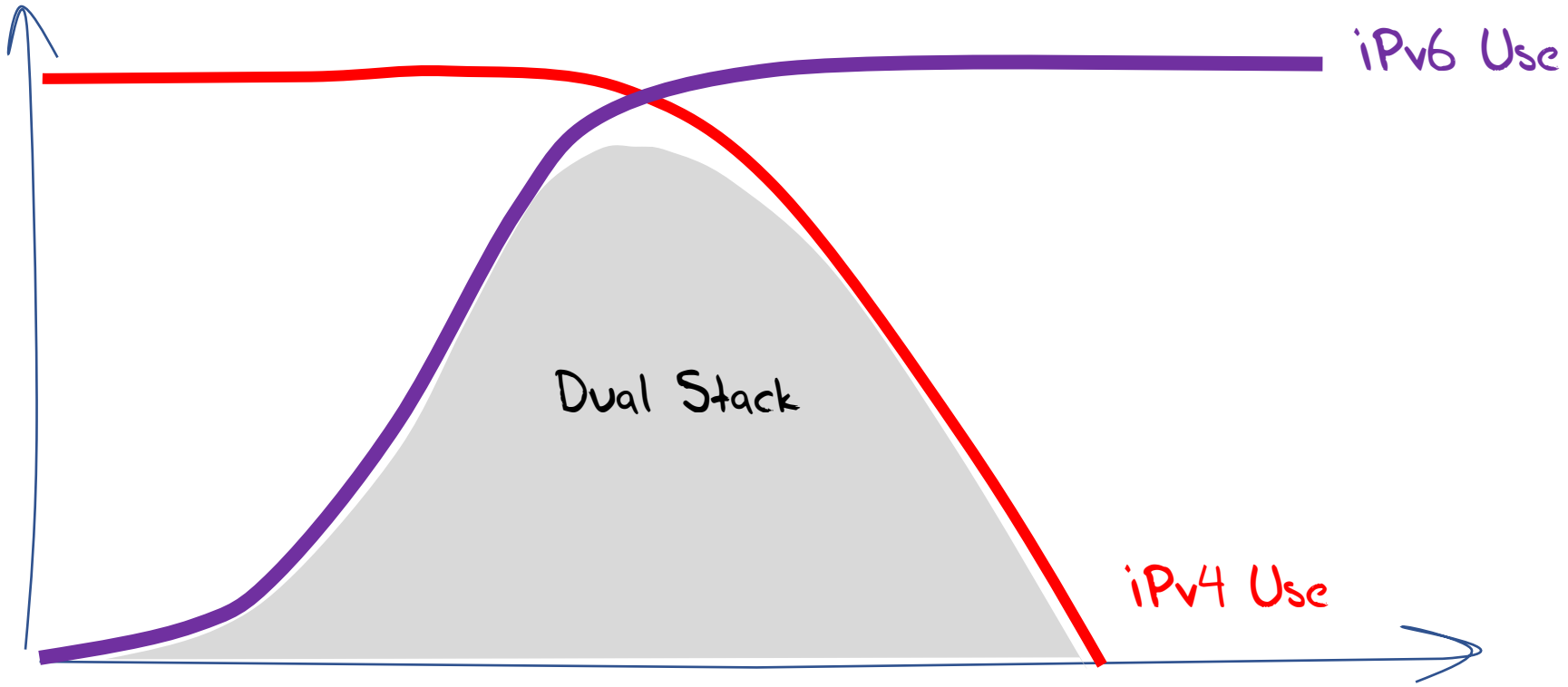
The Overall Objective

- Is **not** a common Dual Stack Internet



The Overall Objective

- Is **not** a common Dual Stack Internet
- It's a common IPv6-only Internet



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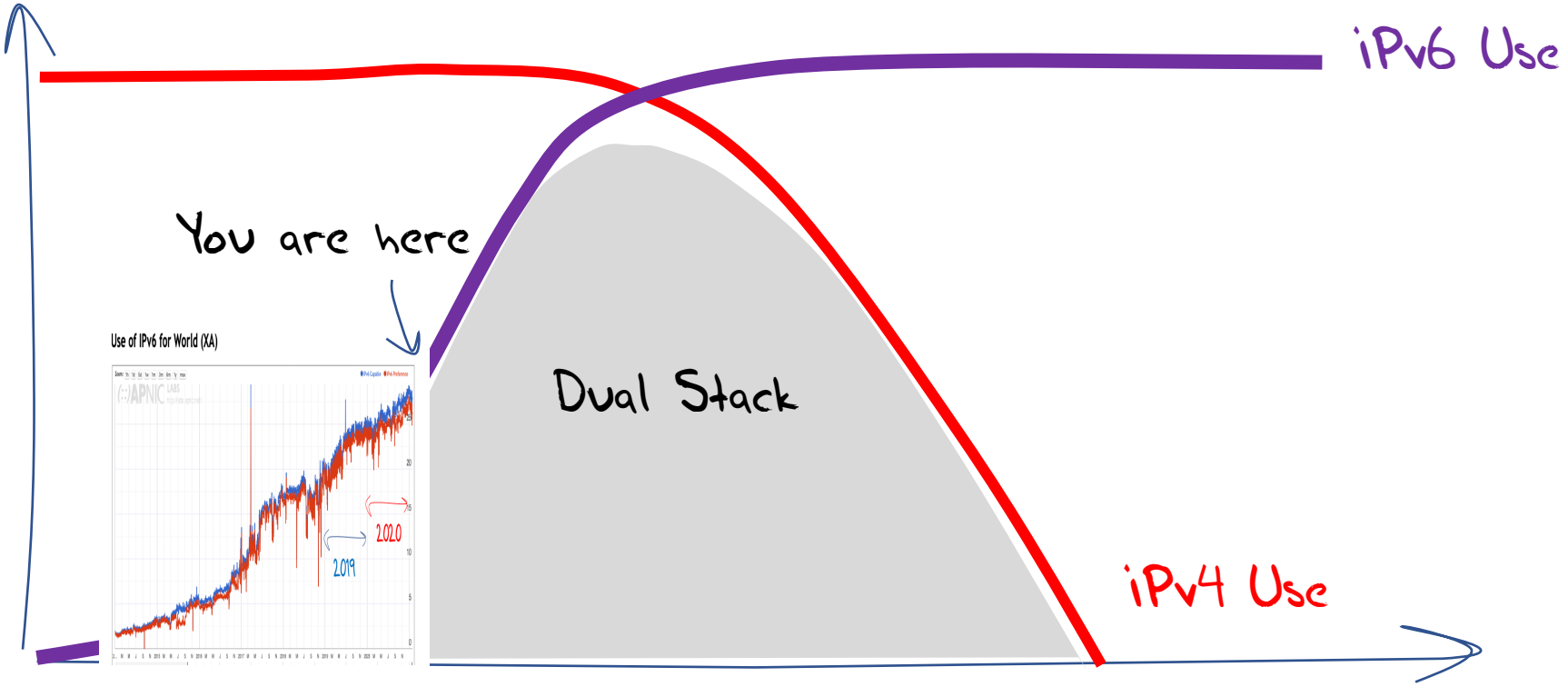
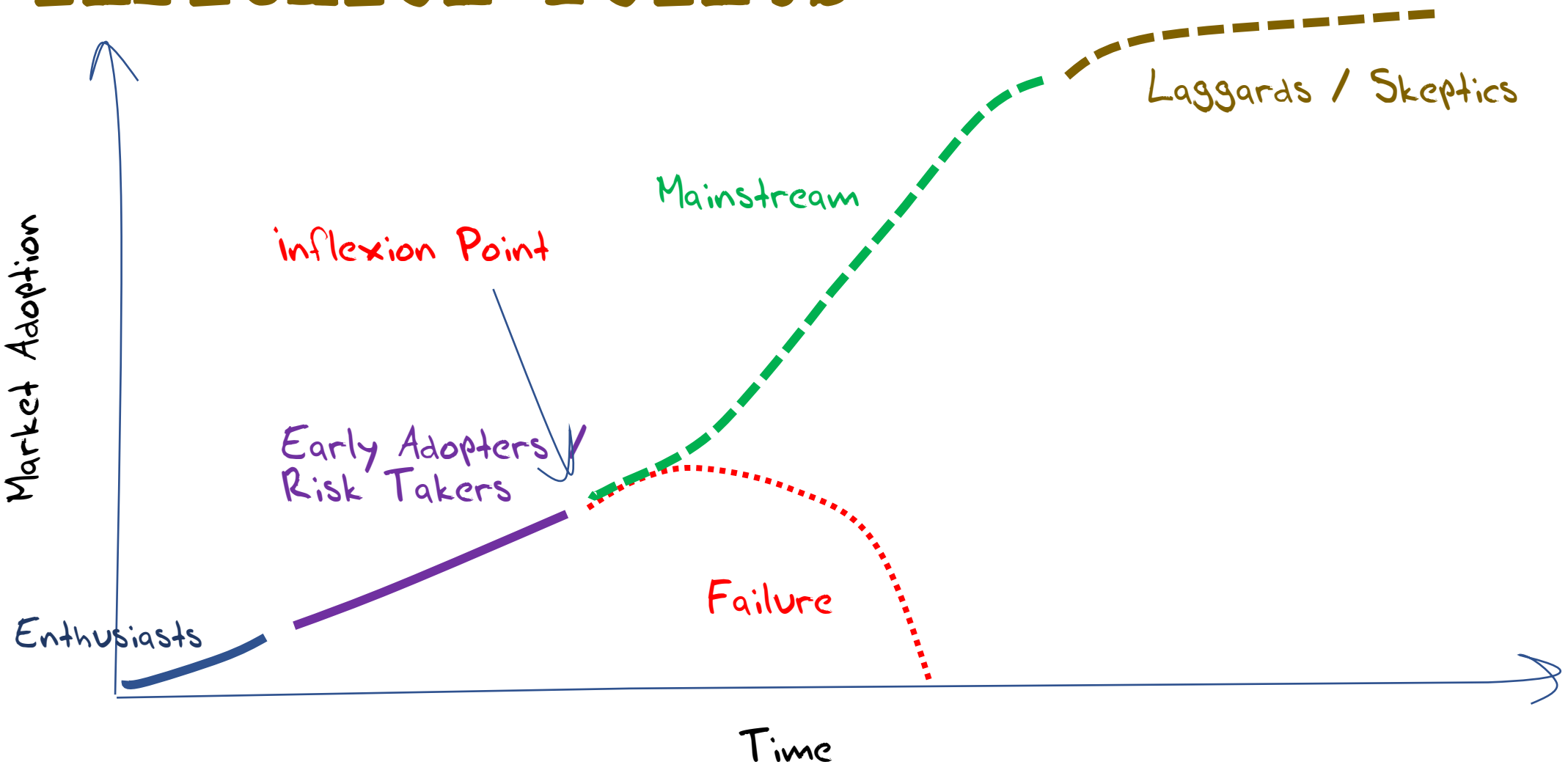
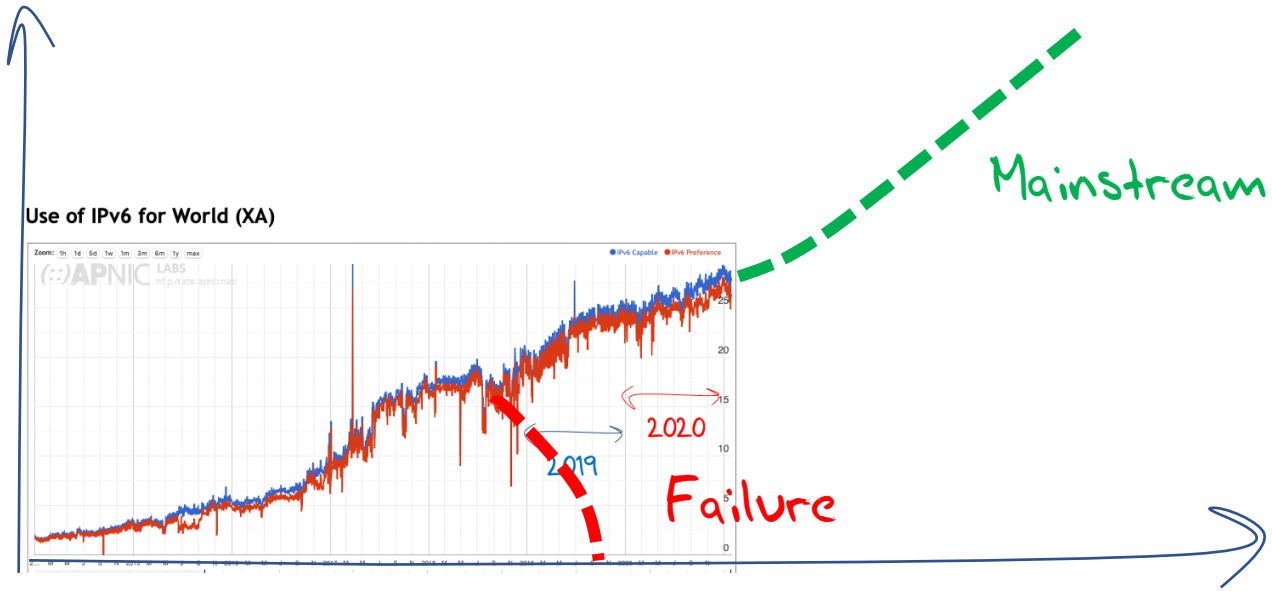


Technology Adoption in Inflexion Points



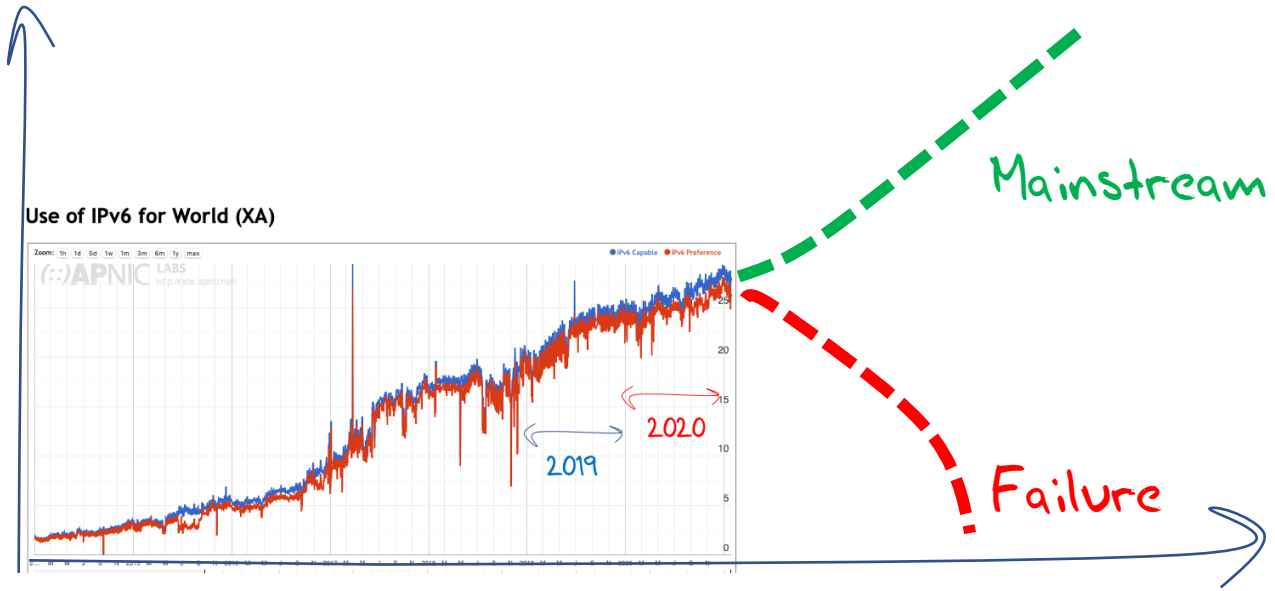
The Big Question

- If there is an inflexion point in IPv6 adoption, then has it already occurred in 2018 (or earlier)?



The Big Question

- If there is an inflexion point in IPv6 adoption, then has it already occurred in 2018 (or earlier)?
- Or are we (still) yet to reach this inflexion point?



The Big Question

- If there is an inflexion point in IPv6 adoption, then has it already occurred in 2018 (or earlier)?

- Or are we (still) yet to reach this inflexion point?

- Its unlikely that this is a tension between IPv4 and IPv6 any longer – that's pretty much a done deal
  - I suspect that the emerging tension in alternative networking futures lies between destination-based packet forwarding network architectures and name-based architectures that use ephemeral associations with network-level addressing

Thanks!