

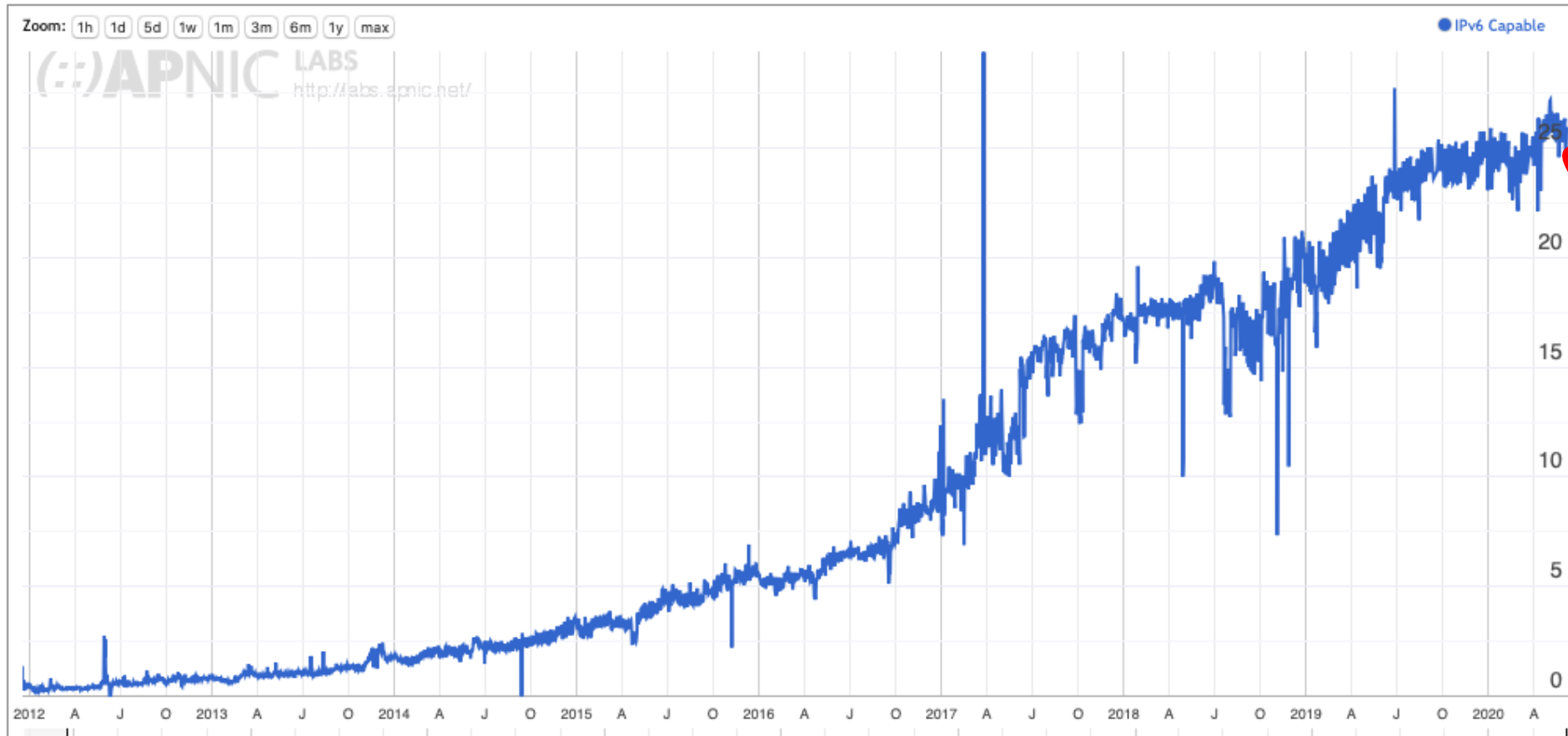
# Technology Adoption Data

## Adoption Rates for IPv6, DNSSEC and RPKI

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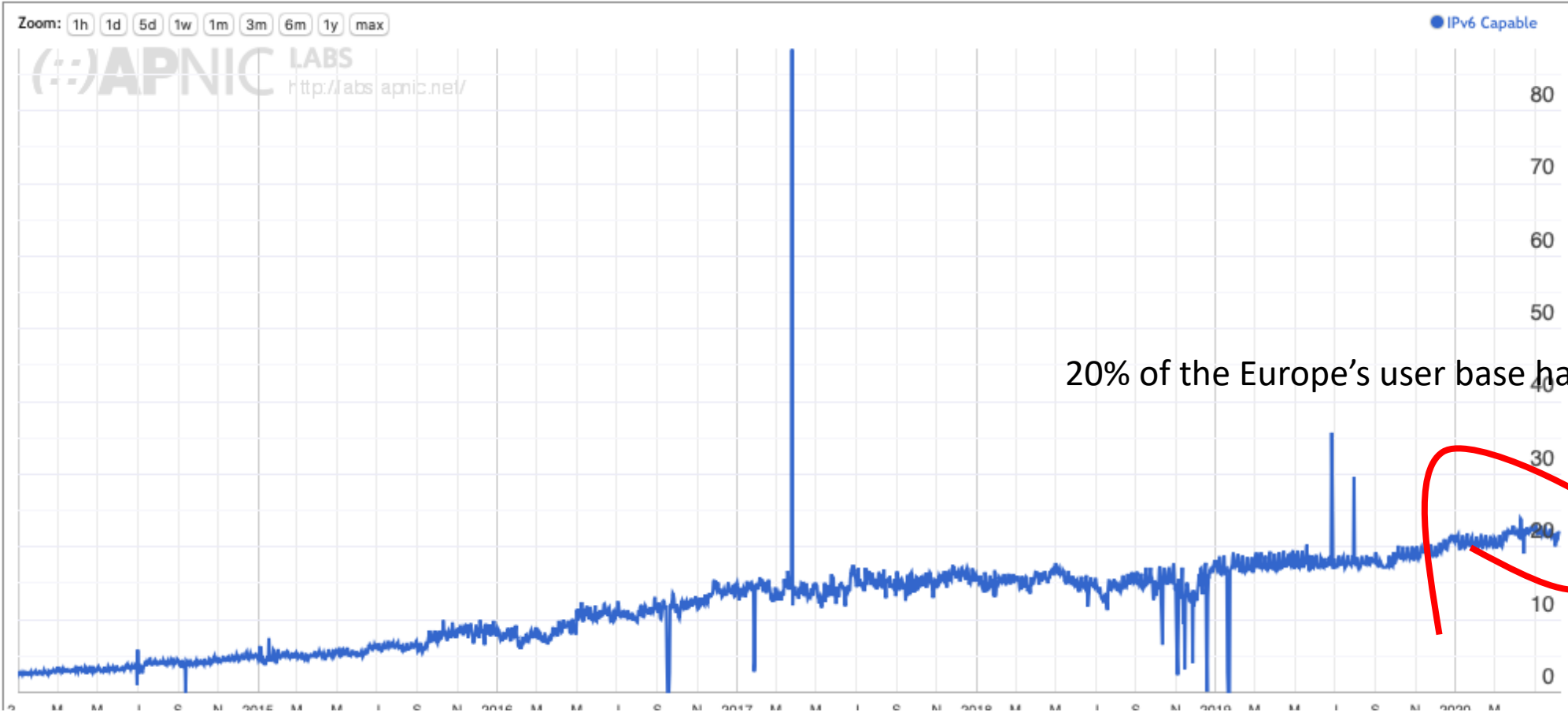
EURODIG  
WS-11  
11 June 2020

# IPv6 adoption - 2012 to Today



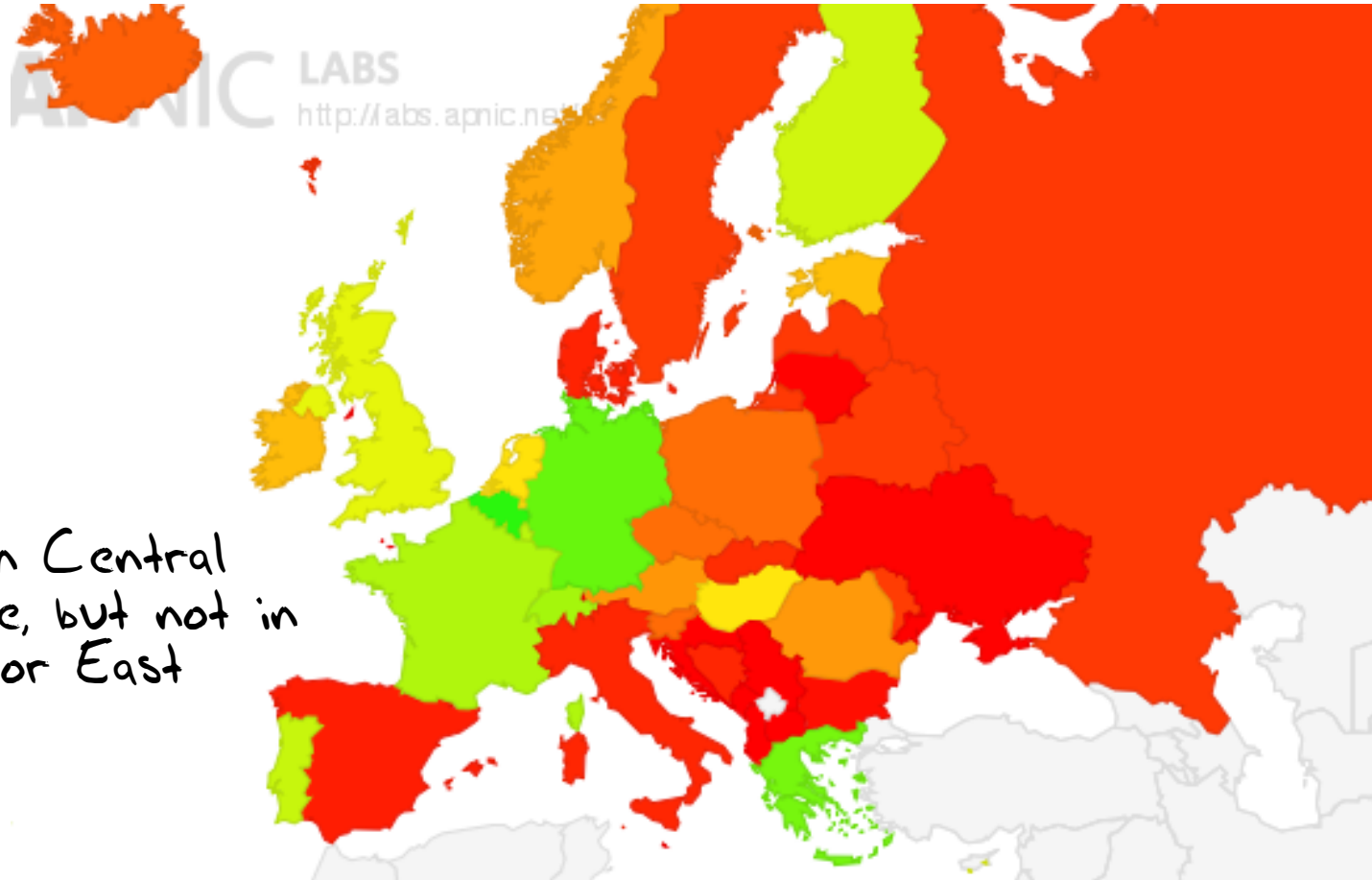
25% of the Internet's user base have IPv6 today

# Europe is (slightly) lagging...



20% of the Europe's user base have IPv6 today

# And is very diverse



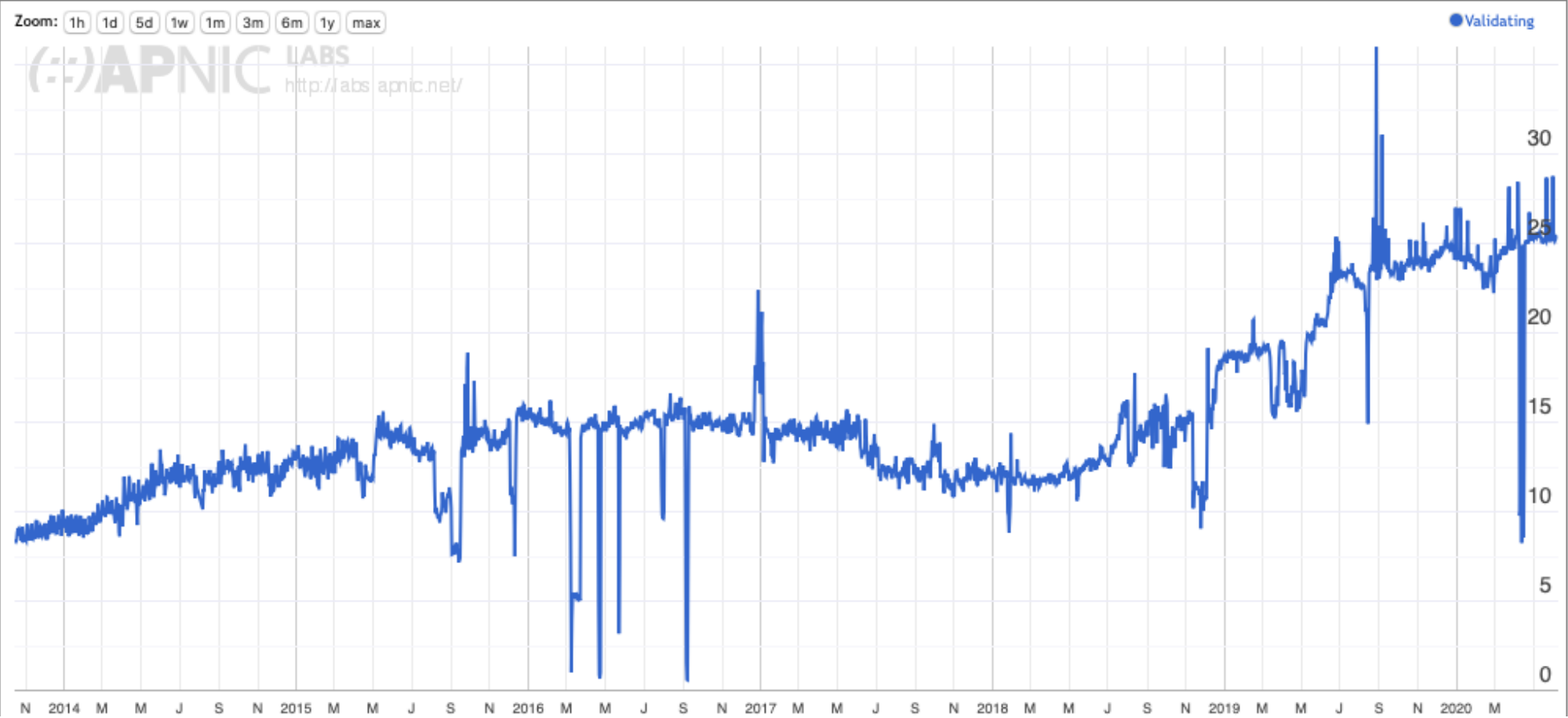
IPv6 is deployed in Central Europe and Greece, but not in the North, South or East

# And is very diverse

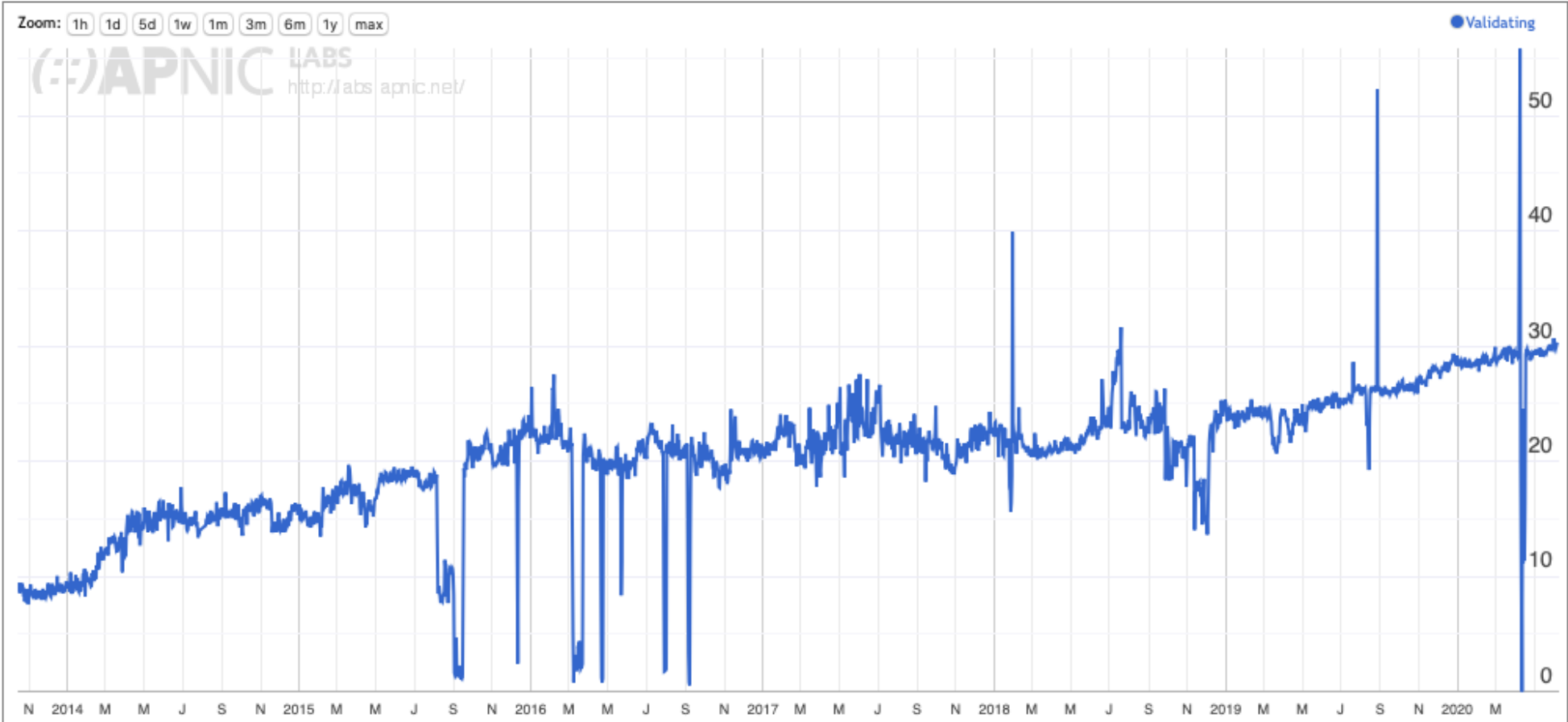


CC	Country	IPv6 Capable
BE	Belgium, Western Europe, Europe	61.16%
DE	Germany, Western Europe, Europe	52.54%
GR	Greece, Southern Europe, Europe	50.35%
CH	Switzerland, Western Europe, Europe	43.79%
FR	France, Western Europe, Europe	42.23%
LU	Luxembourg, Western Europe, Europe	40.76%
PT	Portugal, Southern Europe, Europe	38.97%
FI	Finland, Northern Europe, Europe	37.74%
GB	United Kingdom of Great Britain and Northern Ireland, Northern Europe, Europe	34.61%
HU	Hungary, Eastern Europe, Europe	28.99%
NL	Netherlands, Western Europe, Europe	28.49%
EE	Estonia, Northern Europe, Europe	24.24%
IE	Ireland, Northern Europe, Europe	23.87%
NO	Norway, Northern Europe, Europe	20.73%
RO	Romania, Eastern Europe, Europe	19.25%
AT	Austria, Western Europe, Europe	18.94%
CZ	Czech Republic, Eastern Europe, Europe	13.81%
PL	Poland, Eastern Europe, Europe	13.80%
SI	Slovenia, Southern Europe, Europe	13.47%
IS	Iceland, Northern Europe, Europe	11.81%
MD	Republic of Moldova, Eastern Europe, Europe	7.69%

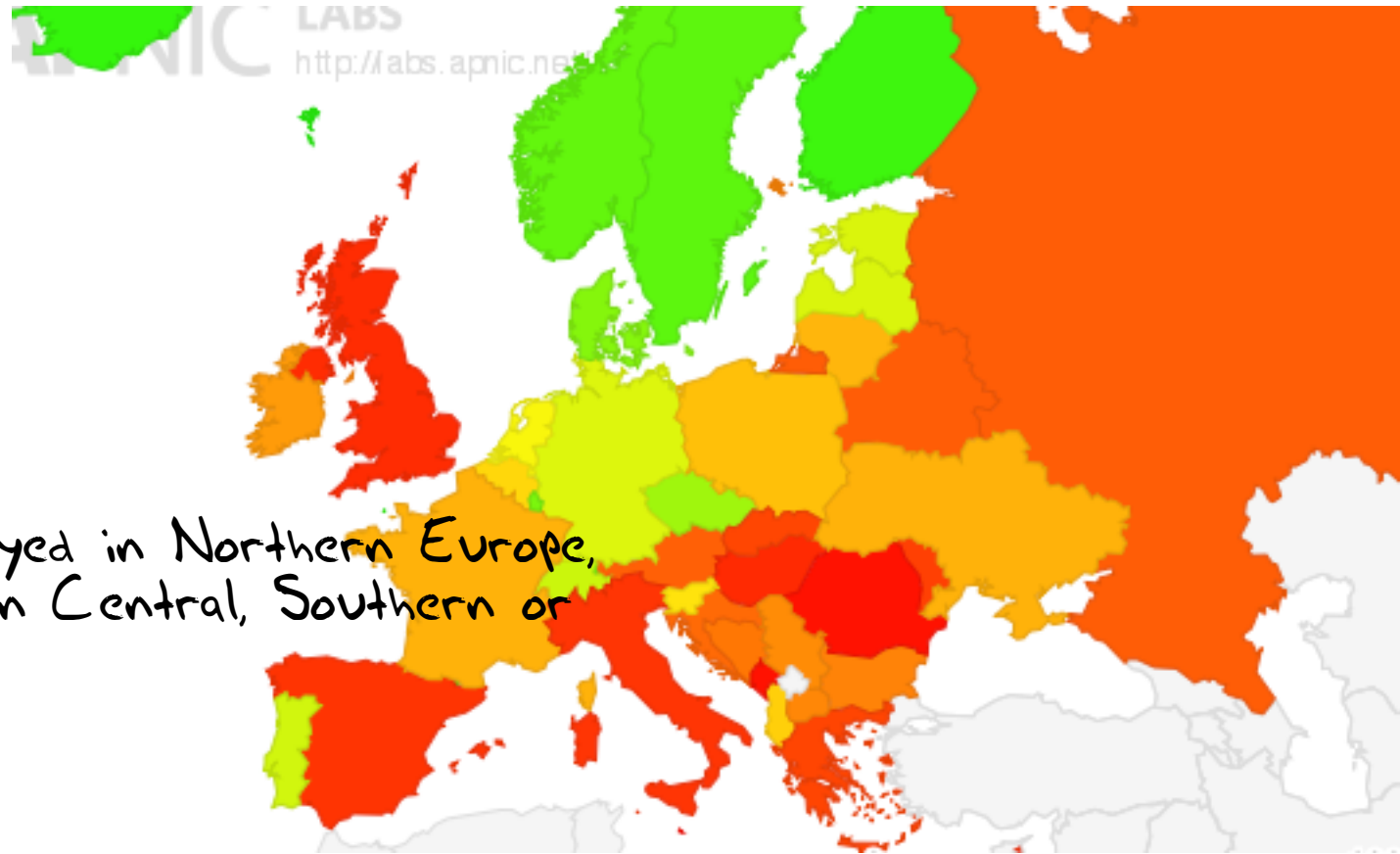
# DNSSEC adoption



# Europe is (slightly) ahead



# Same (but different) diversity



DNSSEC is deployed in Northern Europe, but not as much in Central, Southern or Eastern Europe



# Same

CC	Country	DNSSEC Validates	Samples	Weight	Weighted Samples
IS	Iceland, Northern Europe, Europe	93.52%	386	1.82	702
FO	Faeroe Islands, Northern Europe, Europe	92.04%	113	0.92	103
AD	Andorra, Southern Europe, Europe	90.95%	210	0.78	162
GI	Gibraltar, Southern Europe, Europe	90.91%	121	0.66	79
FI	Finland, Northern Europe, Europe	90.43%	3,573	2.85	10,200
SE	Sweden, Northern Europe, Europe	86.05%	9,875	2.23	22,059
NO	Norway, Northern Europe, Europe	82.64%	4,977	2.18	10,853
LU	Luxembourg, Western Europe, Europe	80.78%	1,353	0.95	1,291
DK	Denmark, Northern Europe, Europe	77.39%	5,711	2.07	11,825
CZ	Czech Republic, Eastern Europe, Europe	71.90%	12,638	0	0
CH	Switzerland, Western Europe, Europe	64.25%	6,937	2.63	18,216
PT	Portugal, Southern Europe, Europe	61.40%	28,264	0.6	16,916
EE	Estonia, Northern Europe, Europe	58.65%	1,688	1.47	2,475
GG	Guernsey, Northern Europe, Europe	58.43%	166	0.44	72
DE	Germany, Western Europe, Europe	57.72%	93,395	1.58	147,799
LV	Latvia, Northern Europe, Europe	53.95%	5,231	0.63	3,297
NL	Netherlands, Western Europe, Europe	50.48%	26,404	1.3	34,376
SI	Slovenia, Southern Europe, Europe	46.76%	5,533	0.67	3,687
AL	Albania, Southern Europe, Europe	41.94%	16,273	0.3	4,860
BE	Belgium, Western Europe, Europe	41.43%	15,244	1.43	21,840
PL	Poland, Eastern Europe, Europe	40.90%	81,676	0.8	65,607
FR	France, Western Europe, Europe	39.59%	115,139	0.98	113,098
UA	Ukraine, Eastern Europe, Europe	36.25%	116,064	0.51	59,484
LT	Lithuania, Northern Europe, Europe	35.84%	6,390	0.75	4,762
JE	Jersey, Northern Europe, Europe	34.81%	316	0.63	199
IE	Ireland, Northern Europe, Europe	30.62%	9,207	0.95	8,787
RS	Serbia, Southern Europe, Europe	28.45%	38,984	0.35	13,809
BG	Bulgaria, Eastern Europe, Europe	26.97%	50,415	0.2	10,177
BA	Bosnia and Herzegovina, Southern Europe, Europe	24.59%	18,984	0.31	5,926
MK	The former Yugoslav Republic of Macedonia, Southern Europe, Europe	24.41%	6,492	0	0

# ty

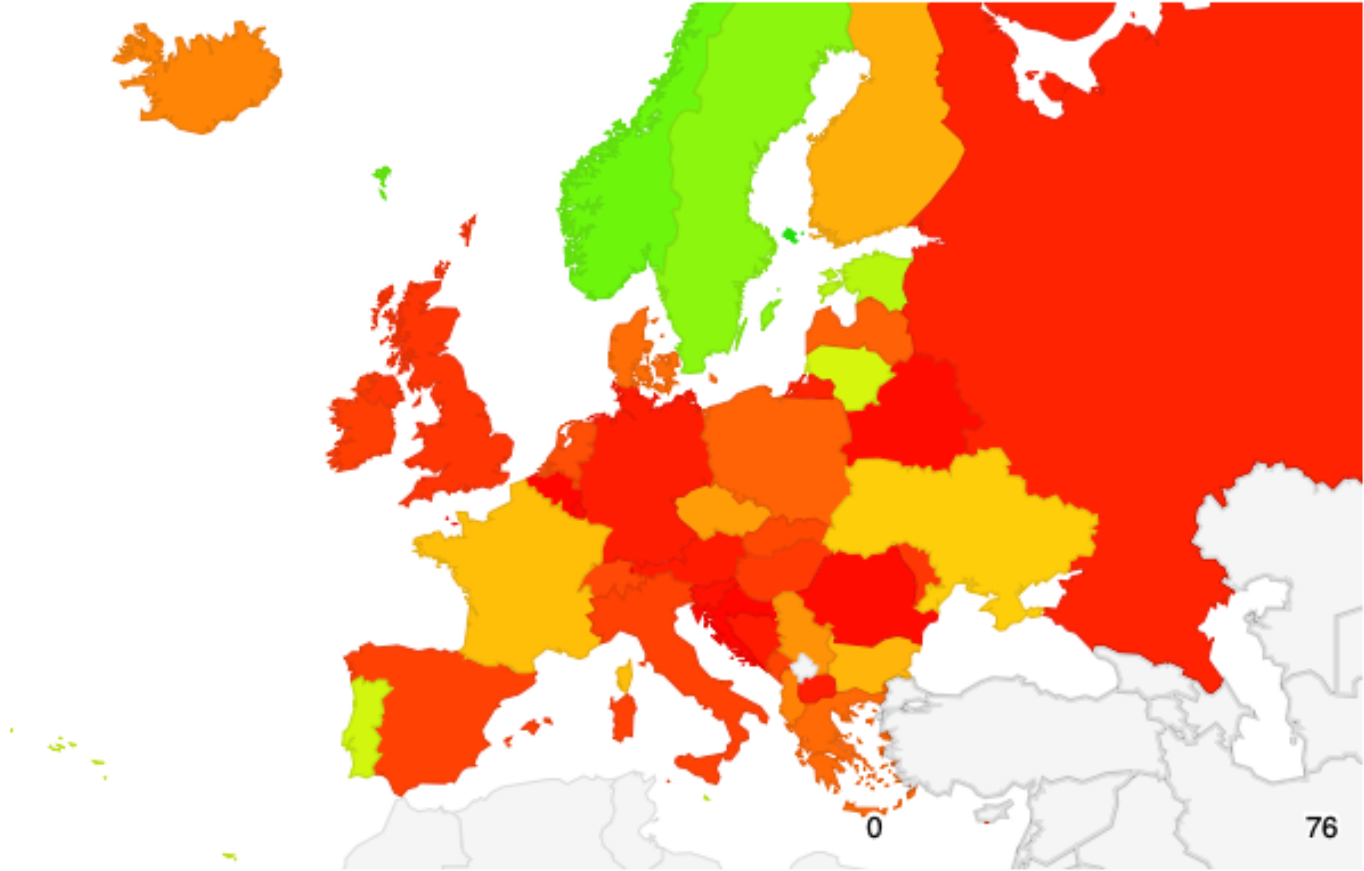
# RPKI ROV Adoption

All End Users behind ROV-aware filters: **5.3%**

European users: **1.7%**

# RPKI ROV Adoption in Europe

Rate of RoV Filtering



# RPKI ROV Adoption in Europe

CC	Country	RPKI Validates	Samples
EU	European Union, Western Europe, Europe	67.98%	506
FO	Faeroe Islands, Northern Europe, Europe	63.50%	589
NO	Norway, Northern Europe, Europe	63.38%	21,208
SE	Sweden, Northern Europe, Europe	58.03%	38,129
EE	Estonia, Northern Europe, Europe	50.46%	6,296
MT	Malta, Southern Europe, Europe	47.69%	4,573
PT	Portugal, Southern Europe, Europe	45.80%	95,276
LT	Lithuania, Northern Europe, Europe	44.90%	21,875
UA	Ukraine, Eastern Europe, Europe	31.85%	382,702
FR	France, Western Europe, Europe	29.46%	389,274
AD	Andorra, Southern Europe, Europe	29.33%	965
BG	Bulgaria, Eastern Europe, Europe	28.03%	133,971
FI	Finland, Northern Europe, Europe	27.03%	13,154
CZ	Czech Republic, Eastern Europe, Europe	24.21%	43,161
RS	Serbia, Southern Europe, Europe	22.67%	121,975
IS	Iceland, Northern Europe, Europe	20.49%	1,762
AL	Albania, Southern Europe, Europe	19.93%	33,410
DK	Denmark, Northern Europe, Europe	16.86%	27,349
SM	San Marino, Southern Europe, Europe	16.76%	185
GR	Greece, Southern Europe, Europe	16.44%	176,182
PL	Poland, Eastern Europe, Europe	15.30%	264,494
LV	Latvia, Northern Europe, Europe	14.93%	17,071
NL	Netherlands, Western Europe, Europe	12.07%	99,738
CH	Switzerland, Western Europe, Europe	11.28%	27,388
SK	Slovakia, Eastern Europe, Europe	11.06%	38,781

Why is there such Diversity in  
Deployment?

# Challenges for adoption:

1. This is a deregulated and highly competitive environment

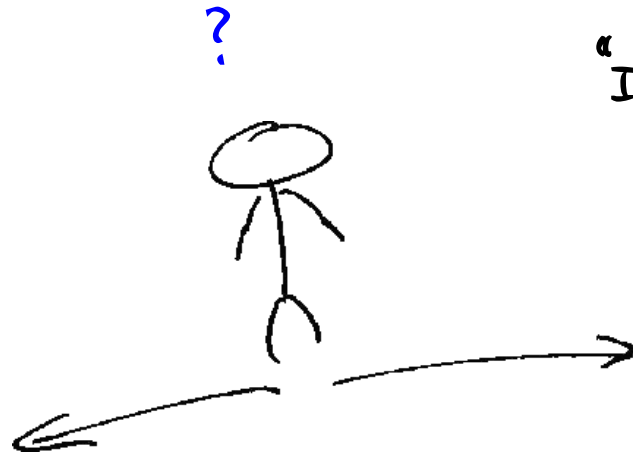
There are many different players  
Each with their own perspective



And all potential approaches will be explored!

# Challenges for adoption:

## 2. The myth of long-term planning



"IPv6 Transition will take many years...

5 years, maybe 10 years, maybe longer"

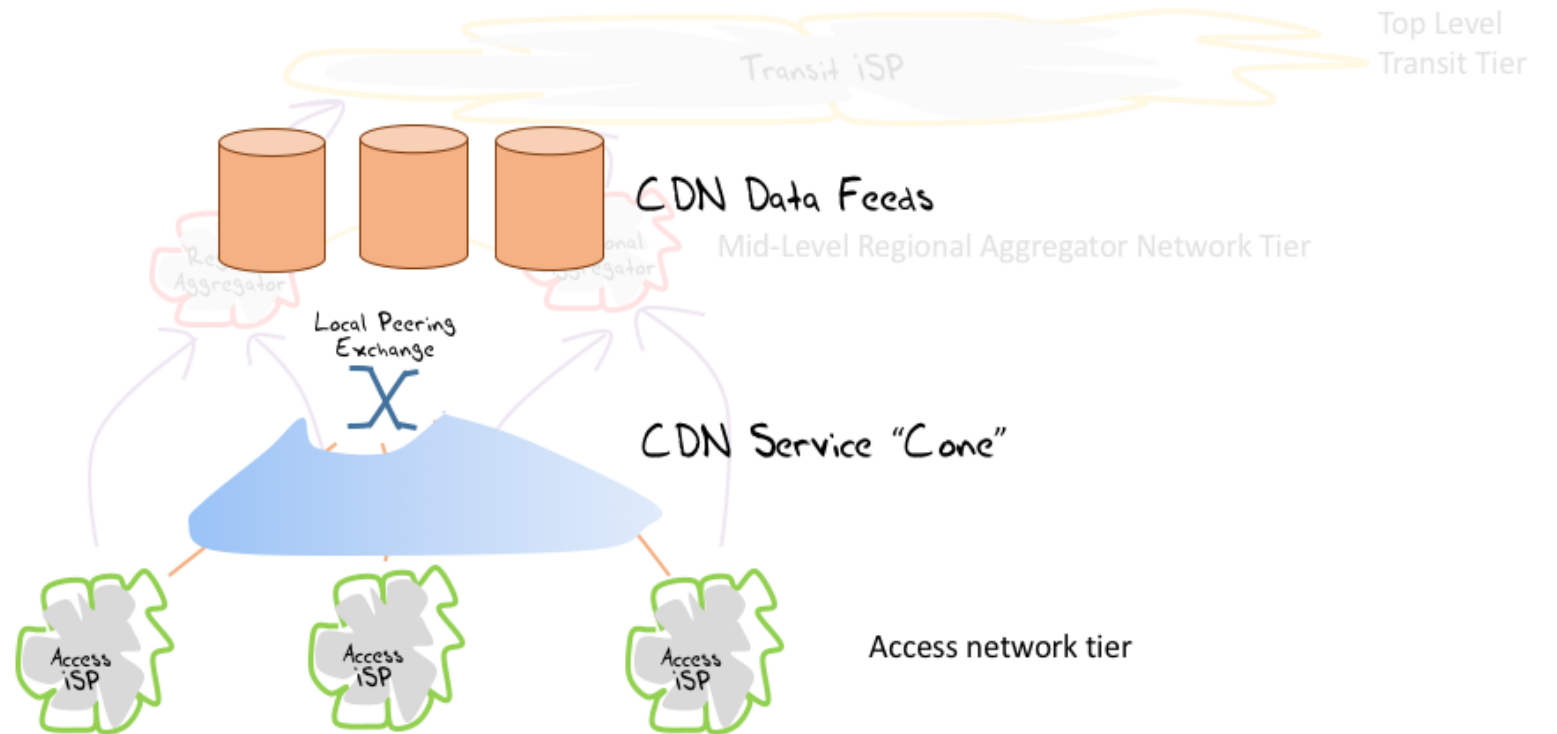
Are we still firmly committed to the plans we had 5 years ago? How about our 10-year-old plans?

The longer the period of transition, the higher the risk of completely losing the plot and heading into other directions!

# Challenges:

## 3. The Internet keeps changing

### Today's Internet Architecture





# Some providers see advantage in adoption

- Competitive positioning in a diverse market
- Early adoption of future mainstream technologies (first user advantage)
- Perception of enhanced utility, security and safety in these more recent technologies

# Other providers see reasons to wait ...

- **IPv6** is a 1990's technology solution to a 1980's networking architectural challenge – CDN feeder networks do not need globally unique address plans across every device all of the time
- **DNSSEC** is only partially-implemented. If we pushed DNSSEC validation to the edges of the network we're scared that the DNS will slow down to unacceptable levels. DANE is a good example of this
- **RPKI Route Origin Validation** makes DNS route hijacking only slightly harder. More moving parts can introduce fragility, and not necessarily enhance operating stability