Measuring DNSSEC Validation:

# A Brief Update on DNSSEC Validation numbers, with an Asia Focus

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The User Perspective of DNSSEC Validation

- Who uses DNS resolvers that perform DNSSEC validation?
  - We measure the resolver behaviour after passing a user a unique DNS name that is DNSSEC-signed To confirm this we also pass the same user a second unique DNS name that is DNSSEC-signed – badly
  - We use Google's advertisement network* to distribute this test to ~ 500,000 users each day

* Our thanks to Google and to Vint Cerf's Research Group

The DNSSEC Validation Map

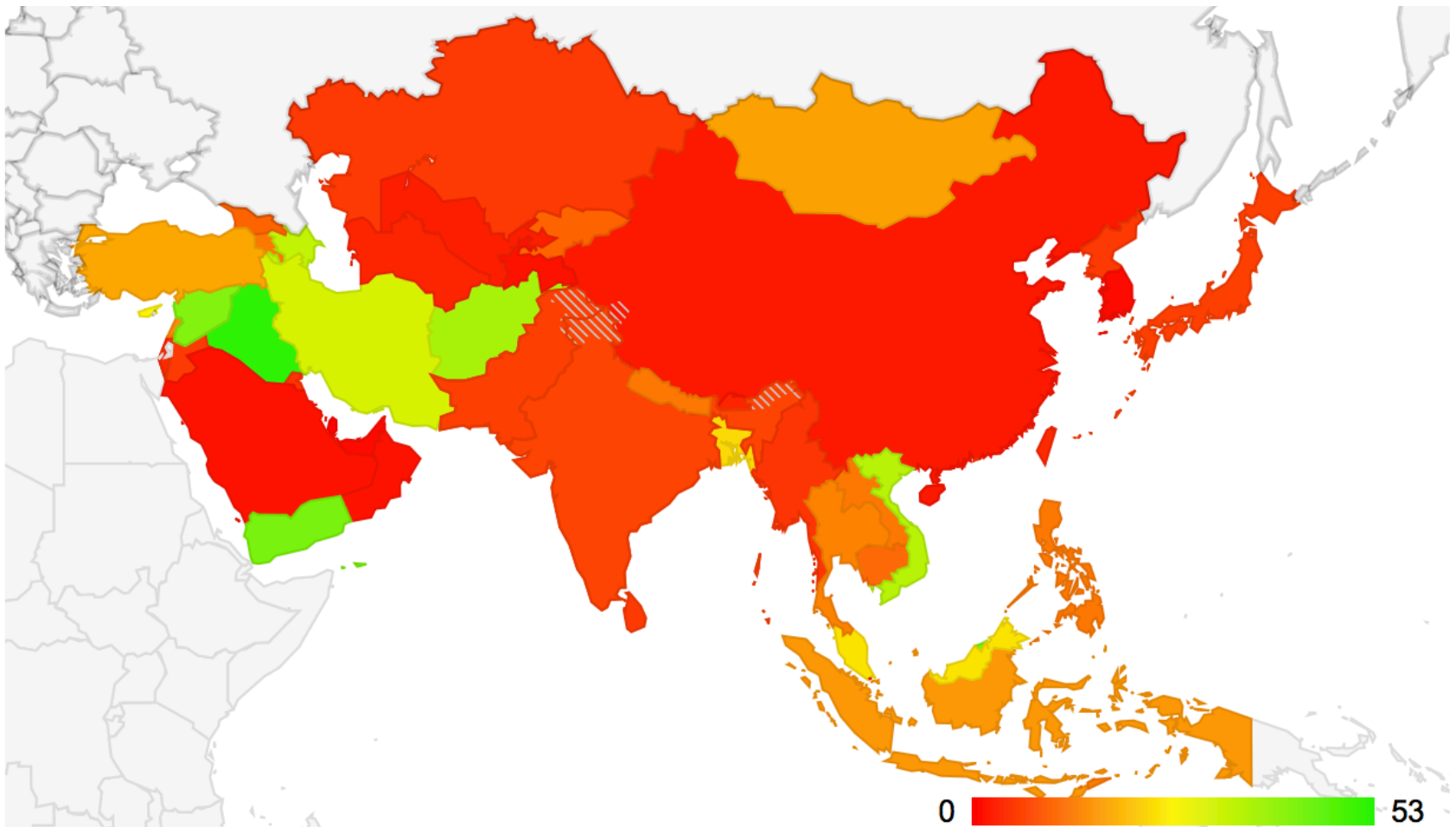% of users who validate DNS queries, by country, January 2015
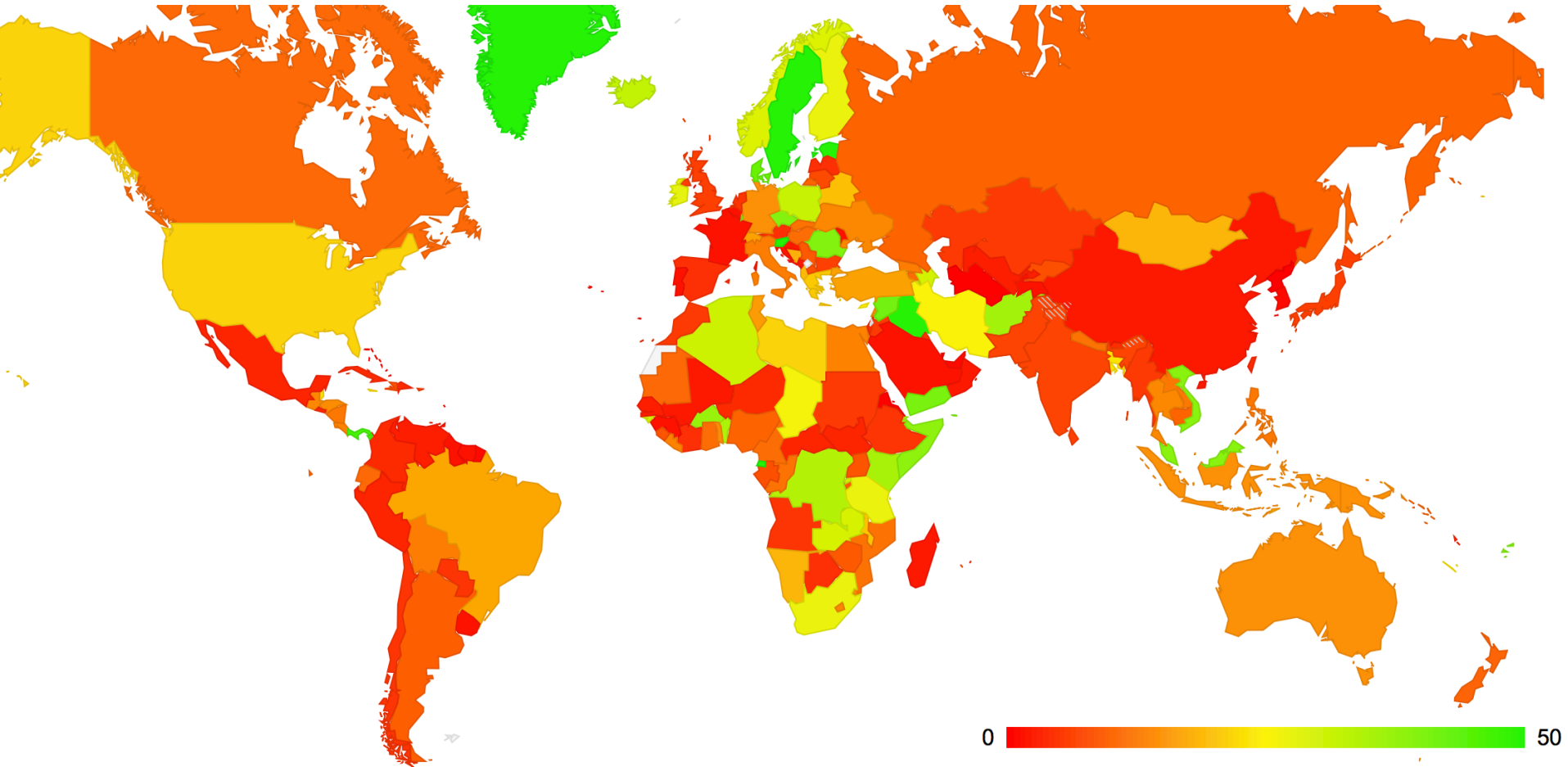
The DNSSEC Validation Map

Yes, Google's PDNS is a major factor here

CC	Country	DNSSEC Validates	Uses Google PDNS	Samples
PM	Saint Pierre and Miquelon, Northern America, Americas	88.71%	98.71%	310
AI	Anguilla, Caribbean, Americas	87.87%	75.00%	272
DM	Dominica, Caribbean, Americas	78.55%	43.73%	359
GL	Greenland, Northern America, Americas	73.10%	6.90%	290
SE	Sweden, Northern Europe, Europe	67.16%	9.72%	76011
SI	Slovenia, Southern Europe, Europe	63.23%	9.26%	140333
AG	Antigua and Barbuda, Caribbean, Americas	60.92%	13.49%	3291
EE	Estonia, Northern Europe, Europe	55.39%	7.87%	39627
IQ	Iraq, Western Asia, Asia	54.83%	23.96%	146363
GQ	Equatorial Guinea, Middle Africa, Africa	50.56%	60.04%	538
YE	Yemen, Western Asia, Asia	49.63%	21.03%	26541
PA	Panama, Central America, Americas	48.89%	57.04%	29294
DK	Denmark, Northern Europe, Europe	46.16%	9.24%	32644
BN	Brunei Darussalam, South-Eastern Asia, Asia	44.59%	81.11%	12547
SY	Syrian Arab Republic, Western Asia, Asia	42.95%	75.65%	9374
CZ	Czech Republic, Eastern Europe, Europe	42.17%	24.70%	200360
RO	Romania, Eastern Europe, Europe	42.07%	10.20%	713485
SO	Somalia, Eastern Africa, Africa	41.49%	78.45%	5922
BB	Barbados, Caribbean, Americas	37.84%	7.51%	11894
BM	Bermuda, Northern America, Americas	37.74%	17.37%	1036
PS	Occupied Palestinian Territory, Western Asia, Asia	37.55%	25.65%	91041
BF	Burkina Faso, Western Africa, Africa	37.20%	76.83%	863
KE	Kenya, Eastern Africa, Africa	36.69%	27.09%	19651
AD	Andorra, Southern Europe, Europe	36.42%	11.45%	1826
AF	Afghanistan, Southern Asia, Asia	36.32%	65.11%	5440
LU	Luxembourg, Western Europe, Europe	35.79%	9.86%	7407
BJ	Benin, Western Africa, Africa	35.35%	38.94%	2116
AZ	Azerbaijan, Western Asia, Asia	35.19%	53.89%	105120
FJ	Fiji, Melanesia, Oceania	35.07%	13.43%	5919
VN	Vietnam, South-Eastern Asia, Asia	34.87%	54.18%	1086849
PL	Poland, Eastern Europe, Europe	34.81%	14.20%	495390
DZ	Algeria, Northern Africa, Africa	33.49%	75.42%	599405
IS	Iceland, Northern Europe, Europe	33.44%	7.73%	9534
IR	Iran (Islamic Republic of), Southern Asia, Asia	32.42%	56.99%	1502
CD	Democratic Republic of the Congo, Middle Africa, Africa	31.86%	76.19%	882
RW	Rwanda, Eastern Africa, Africa	31.18%	35.23%	2867
IE	Ireland, Northern Europe, Europe	29.54%	10.62%	57389
TZ	United Republic of Tanzania, Eastern Africa, Africa	29.15%	44.63%	4275
ZA	South Africa, Southern Africa, Africa	28.89%	13.48%	43043
CY	Cyprus, Western Asia, Asia	28.69%	6.93%	66835
FI	Finland, Northern Europe, Europe	28.04%	5.90%	48735
DJ	Djibouti, Eastern Africa, Africa	27.88%	59.75%	3389
ZM	Zambia, Eastern Africa, Africa	27.85%	50.72%	1386
NO	Norway, Northern Europe, Europe	27.08%	6.70%	34645

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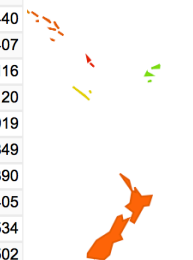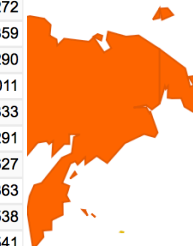
DNSSEC Validation in Asia

% of users who validate DNS queries, by country, January 2015

DNSSEC Validation in Asia

CC	Country	DNSSEC Validates	Uses Google PDNS	Samples
IQ	Iraq，Western Asia，Asia	52.03%	25.47%	98705
YE	Yemen，Western Asia，Asia	42.30%	22.75%	17750
BN	Brunei Darussalam，South-Eastern Asia，Asia	41.96%	79.81%	9095
SY	Syrian Arab Republic，Western Asia，Asia	41.15%	76.67%	5942
PS	Occupied Palestinian Territory，Western Asia，Asia	39.37%	27.49%	64176
AF	Afghanistan，Southern Asia，Asia	36.87%	65.91%	4207
VN	Vietnam，South-Eastern Asia，Asia	35.07%	56.47%	847372
AZ	Azerbaijan，Western Asia，Asia	33.81%	54.11%	79245
IR	Iran (Islamic Republic of)，Southern Asia，Asia	31.37%	58.41%	1017
CY	Cyprus，Western Asia，Asia	26.64%	8.36%	45773
MY	Malaysia，South-Eastern Asia，Asia	24.56%	37.89%	313459
BD	Bangladesh，Southern Asia，Asia	23.75%	43.44%	147871
TR	Turkey，Western Asia，Asia	18.17%	22.15%	2179684
MN	Mongolia，Eastern Asia，Asia	17.51%	14.81%	17817
ID	Indonesia，South-Eastern Asia，Asia	16.65%	23.12%	779944
LB	Lebanon，Western Asia，Asia	15.30%	25.43%	14192
TH	Thailand，South-Eastern Asia，Asia	14.35%	27.77%	1113487
TL	Timor-Leste，South-Eastern Asia，Asia	13.57%	13.12%	221
MV	Maldives，Southern Asia，Asia	13.41%	28.32%	6482
NP	Nepal，Southern Asia，Asia	13.33%	19.29%	40891
PH	Philippines，South-Eastern Asia，Asia	13.25%	17.71%	610608
AM	Armenia，Western Asia，Asia	13.11%	18.03%	59180
LA	Lao People's Democratic Republic，South-Eastern Asia，Asia	13.11%	49.74%	6558
KH	Cambodia，South-Eastern Asia，Asia	11.56%	32.77%	30370
GE	Georgia，Western Asia，Asia	11.08%	9.83%	122276
KG	Kyrgyzstan，Central Asia，Asia	10.70%	27.69%	15040
IN	India，Southern Asia，Asia	7.33%	23.04%	942112
PK	Pakistan，Southern Asia，Asia	7.08%	16.47%	685860
JP	Japan，Eastern Asia，Asia	6.90%	7.32%	390336
HK	Hong Kong Special Administrative Region of China，Eastern Asia，Asia	6.65%	17.61%	166375
JO	Jordan，Western Asia，Asia	6.63%	16.42%	45684
LK	Sri Lanka，Southern Asia，Asia	6.45%	15.10%	92225
KZ	Kazakhstan，Central Asia，Asia	6.21%	13.49%	87233
MM	Myanmar，South-Eastern Asia，Asia	6.17%	17.82%	4260
KW	Kuwait，Western Asia，Asia	5.86%	11.56%	12638
IL	Israel，Western Asia，Asia	4.77%	13.27%	156402
TW	Taiwan，Eastern Asia，Asia	4.46%	14.26%	639248
BT	Bhutan，Southern Asia，Asia	4.22%	13.76%	1446
UZ	Uzbekistan，Central Asia，Asia	3.63%	12.40%	10458
SG	Singapore，South-Eastern Asia，Asia	3.62%	11.44%	62737

A few major changes in the last few months in Asia:

Folk who turned ON validation: ☺

- TMNET, Malaysia (AS4877) 60% of users validate (via Google PDNS)

- SPARKNZ, New Zealand (AS4771), 16% of users validating, using local resolvers

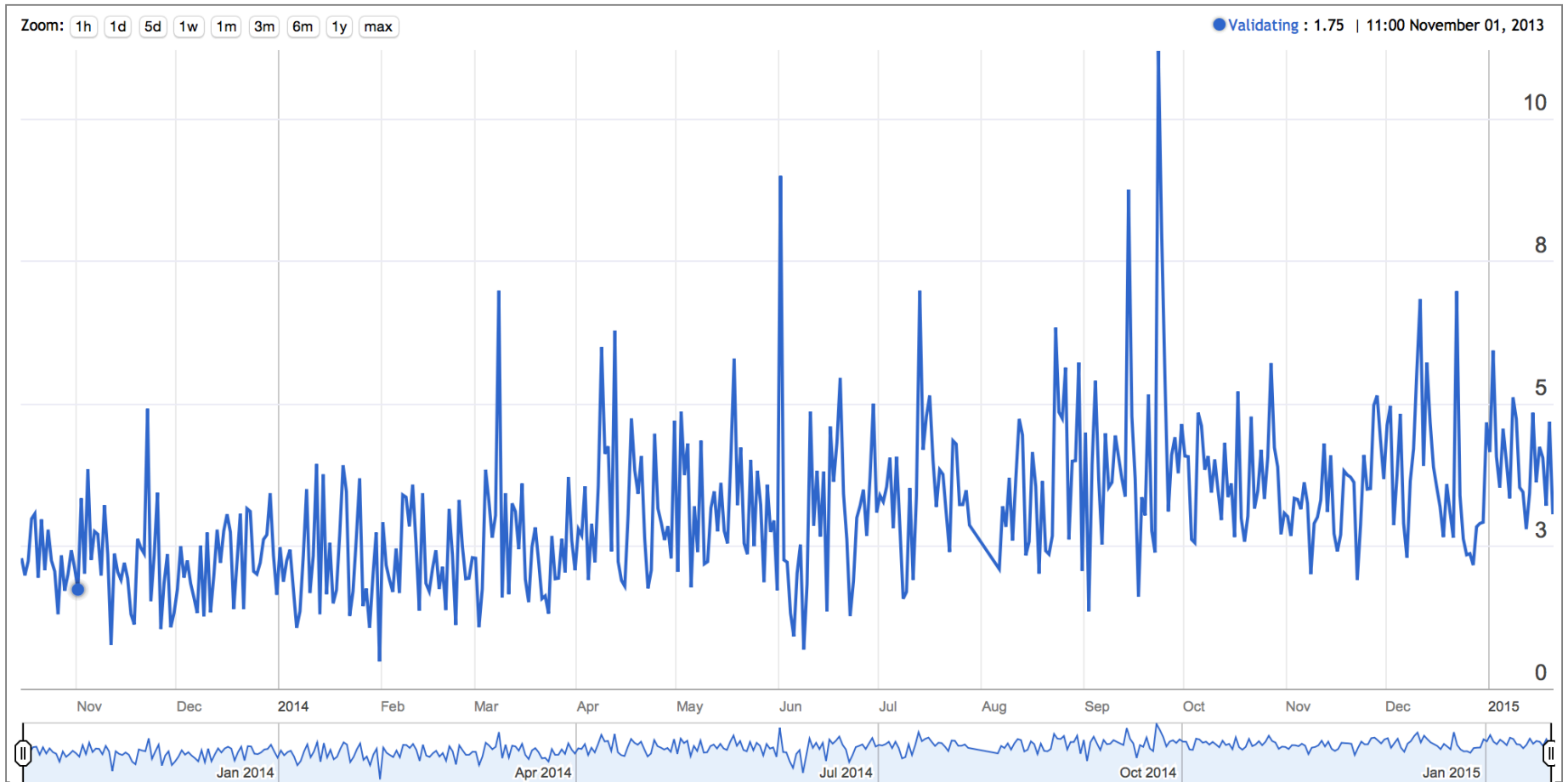- MCS, Mongolia (AS1782), 15% of users validating (via Google PDNS)

A few major changes in the last few months in Asia:

Folk who turned OFF validation ☹

- TeleYemen, Yemen, AS12486, from 80% in 2014 to 40% today

- VNPT, Vietnam, AS45899, from 55% in 2014 to 35% today

- Telekomnet PT, Indonesia AS 17974, from 30% in 2014 to 7% today
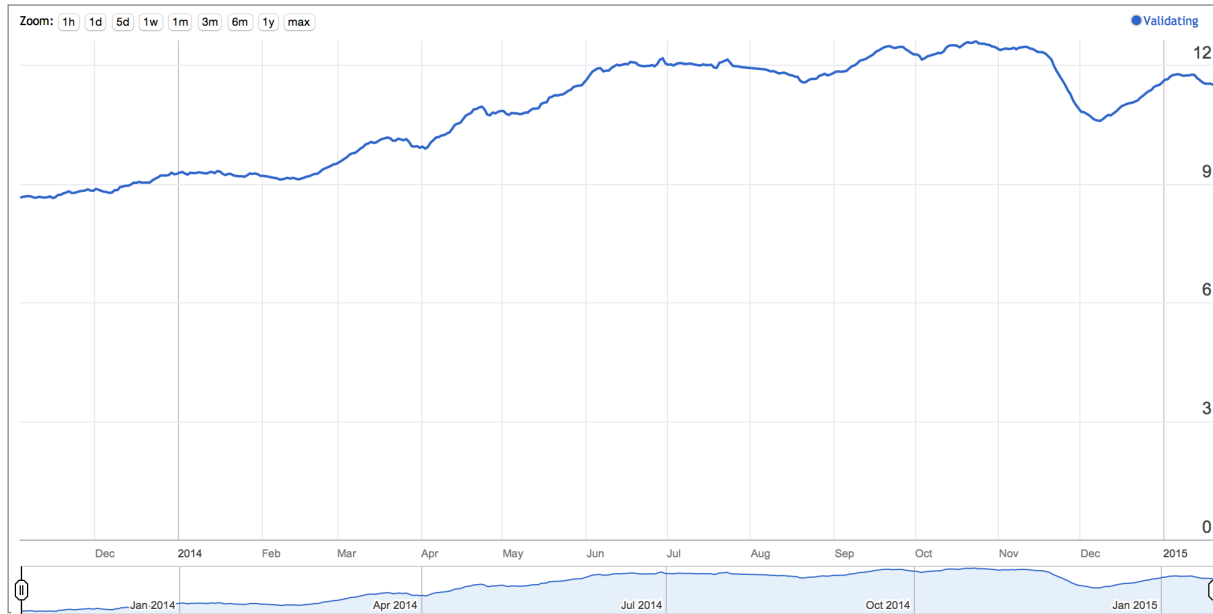
And for Singapore

And for Singapore

ASN	AS Name	DNSSEC Validates	Samples ▼
AS9506	MAGIX-SG-AP Magix Broadband Network	1.70%	28060
AS10091	SCV-AS-AP StarHub Cable Vision Ltd	4.36%	11770
AS55430	STARHUBINTERNET-AS-NGNBN Starhub Internet Pte Ltd	2.77%	9340
AS4773	MOBILEONELTD-AS-AP MobileOne Ltd. MobileInternet Service Provider Singapore	4.36%	6278
AS3758	ERX-SINGNET SingNet	2.96%	6250
AS4657	STARHUBINTERNET-AS StarHub Internet Exchange	11.70%	2325
AS9989	EQUINIX-AP Equinix Singapore Pte Ltd	1.70%	1651
AS133165	DIGITALOCEAN-AS-AP Digital Ocean, Inc.	39.57%	1362
AS9874	STARHUB-IX StarHub Broadband	13.93%	1213
AS24482	SGGS-AS-AP SG.GS	9.74%	1171
AS17547	QALA-SG-AP M1 CONNECT PTE. LTD.	3.82%	1073
AS56300	MYHOSTING-AS-AP MYHOSTING	3.44%	1047
AS7472	NUS-AS-AP Computer Centre	0.40%	995
AS9419	NTU-AS-AP Nanyang Technological University	1.15%	873
AS17819	ASN-EQUINIX-AP Equinix Asia Pacific	5.31%	829
AS10146	FORD-MOTOR-CO-SG-AP Ford Motor Company	0.26%	771
AS45143	SINGTELMOBILE-AS-AP SINGTEL MOBILE INTERNET SERVICE PROVIDER Singapore	0.72%	694
AS9911	CONNECTPLUS-AP Singapore Telecom	2.56%	586
AS132047	MYREPUBLIC-SG MyRepublic Ltd.	3.95%	582
AS18106	VIEWQWEST-SG-AP Viewqwest Pte Ltd	5.67%	529
AS24012	THOMSONREUTERS-SG 18 Science Park Drive	0.27%	369
AS24331	EBAY-ASIA-AS eBay Inc ASIA ASN eCommerce San Jose	0.00%	303
AS10024	LGA-AS-SG-AP LGA International	1.01%	298
AS45445	GM-AP-GMKOREA General Motors Korea, Bupyeong	0.00%	254
AS133387	IDA-AS-IDAHQ-NG Infocomm Development Authority of Singapore	0.00%	226
AS131217	INFINEON-SG 8 Kallang Sector	0.00%	208
AS45166	OSINET-COMMS-AS-AP OSINet Communications Pte Ltd	7.25%	193
AS56308	TELIN-NET-SG TELEKOMUNIKASI INDONESIA INTERNATIONAL, PTE.LTD	49.44%	178

Some Observations about Validation

- The population of users who validate DNS responses has been steady at ~12% for the past year.

    - 12% is still three times larger than the count of end users who can use IPv6!

- The major factor in validating resolvers still lies with Google's Public DNS service, which is the resolver system that is currently used by ~15% of the world's users

- However, Google's PDNS is not the entire story for DNSSEC validation. Countries with visible pools of local validating resolvers include: Sweden, Slovenia, Estonia, Denmark, Czech Republic, Luxembourg, Poland, Iceland, Ireland, Finland, Greece, South Africa, Greenland, Iraq, Yemen and Cyprus

http://stats.labs.apnic.net/dnssec