

Measuring DNSSEC Validation:

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

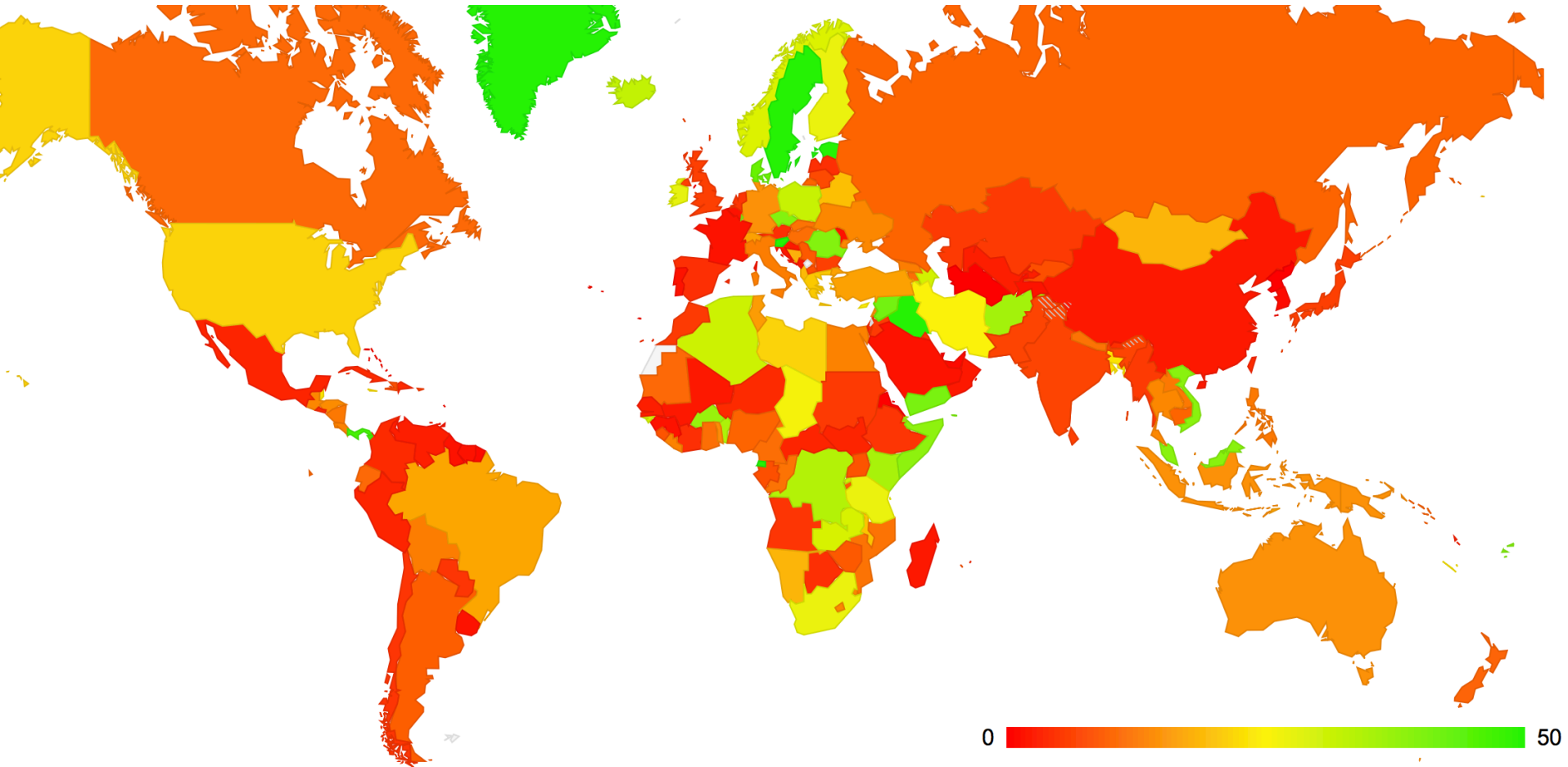
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APNIC Labs
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The User Perspective of DNSSEC Validation

- 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

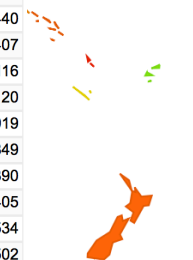
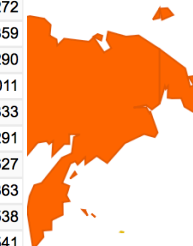


% of users who validate DNS queries, by country, January 2015

Yes, Google's PDNS is a major factor here

The DNSSEC Validation Map

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



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: 😊

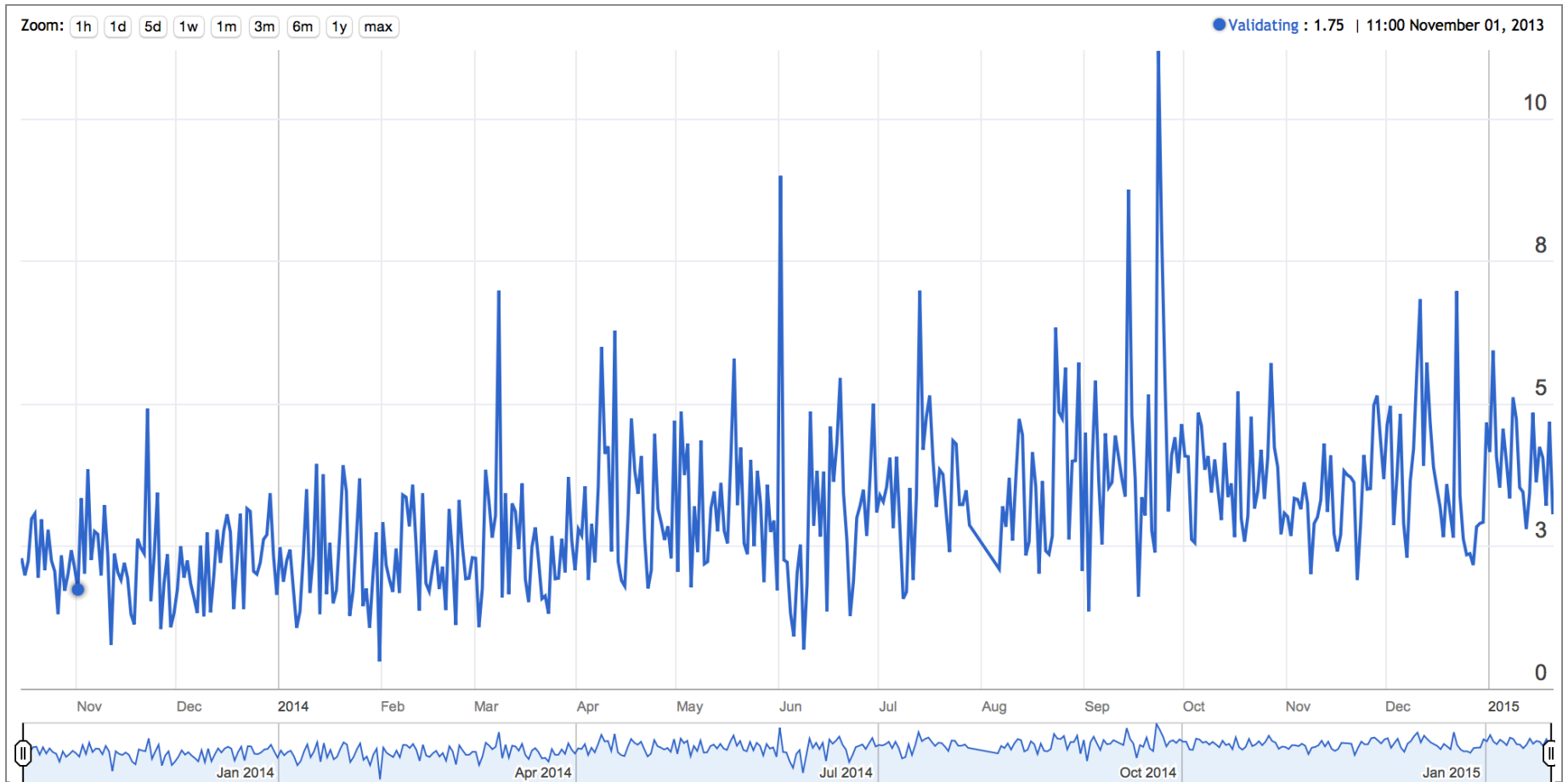
- TMNET, Malaysia (AS4877) 60% of users validate (via Google PDNS)
- SPARKNZ, New Zealand (AS4771), 16% of users validating, using local resolvers
- MCS, Mongolia (AS1782), 15% of users validating (via Google PDNS)

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



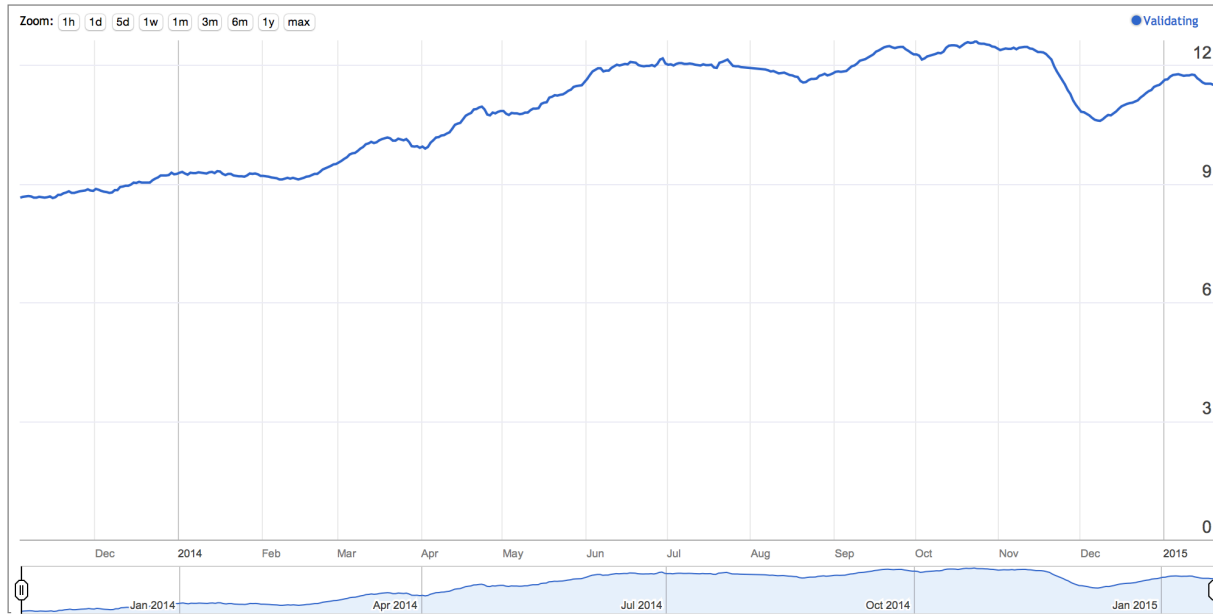
And for Singapore

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 massively larger than the level of 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

Use of DNSSEC Validation for World (XA)



Average Interval (days) 20
 Show Google PDNS Use
 Hide Regio
Redraw



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