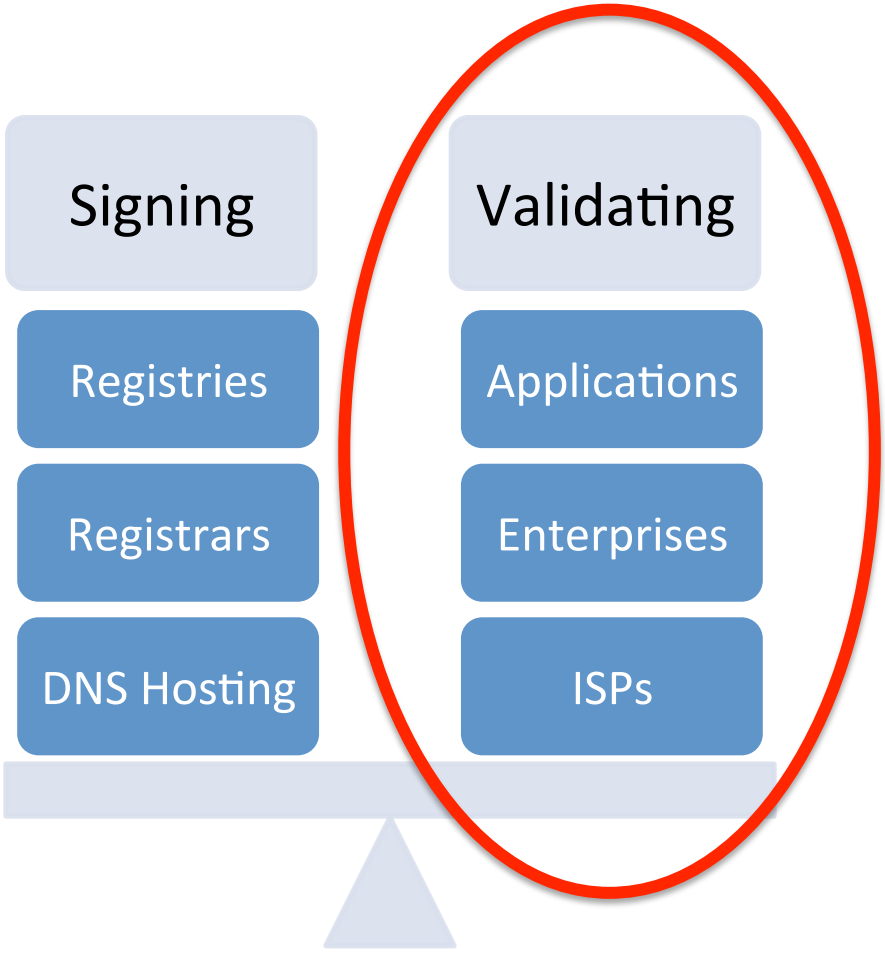
State of DNSSEC Deployment

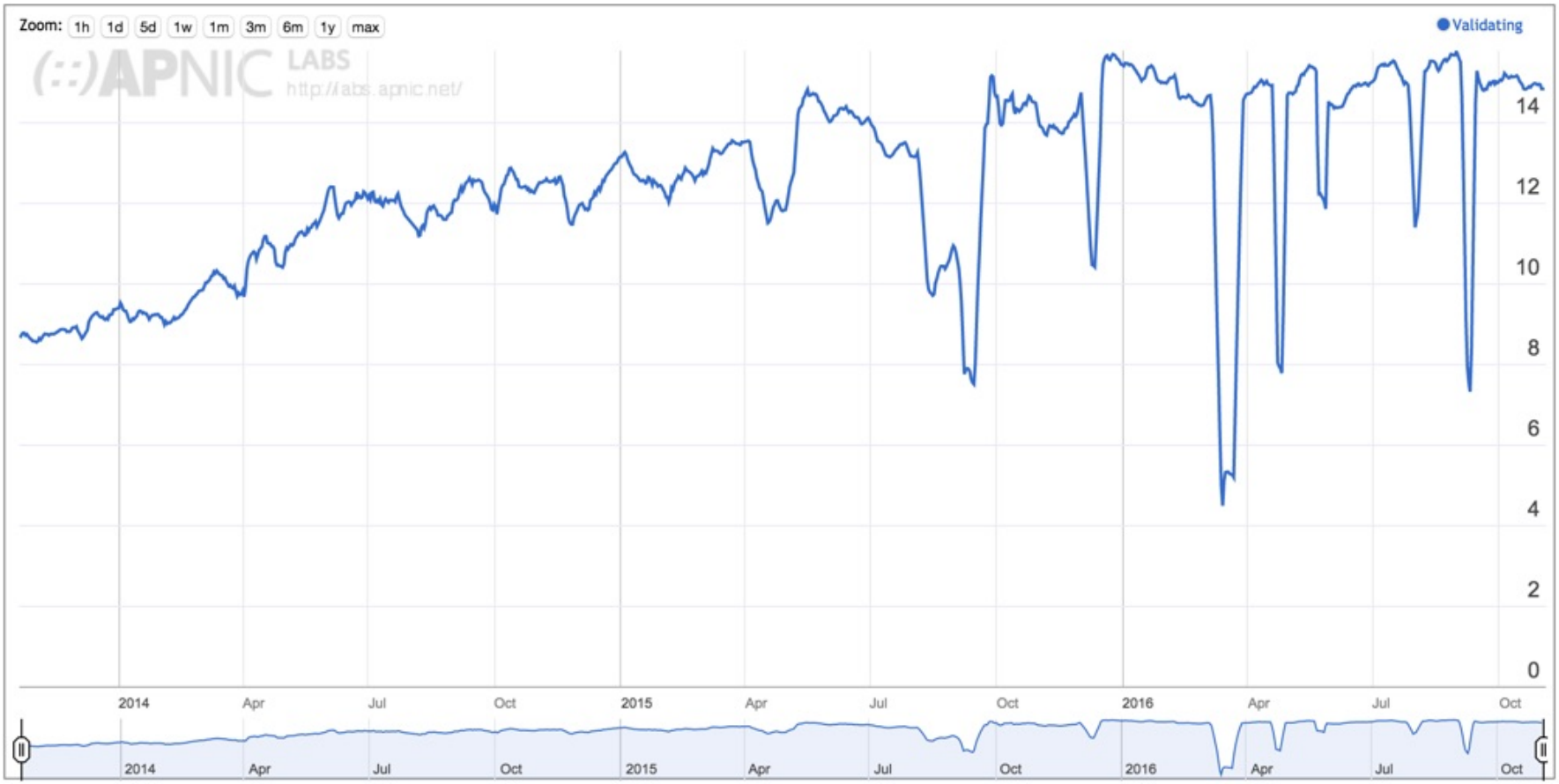
IEPG – 13 November 2016

Dan York, Internet Society

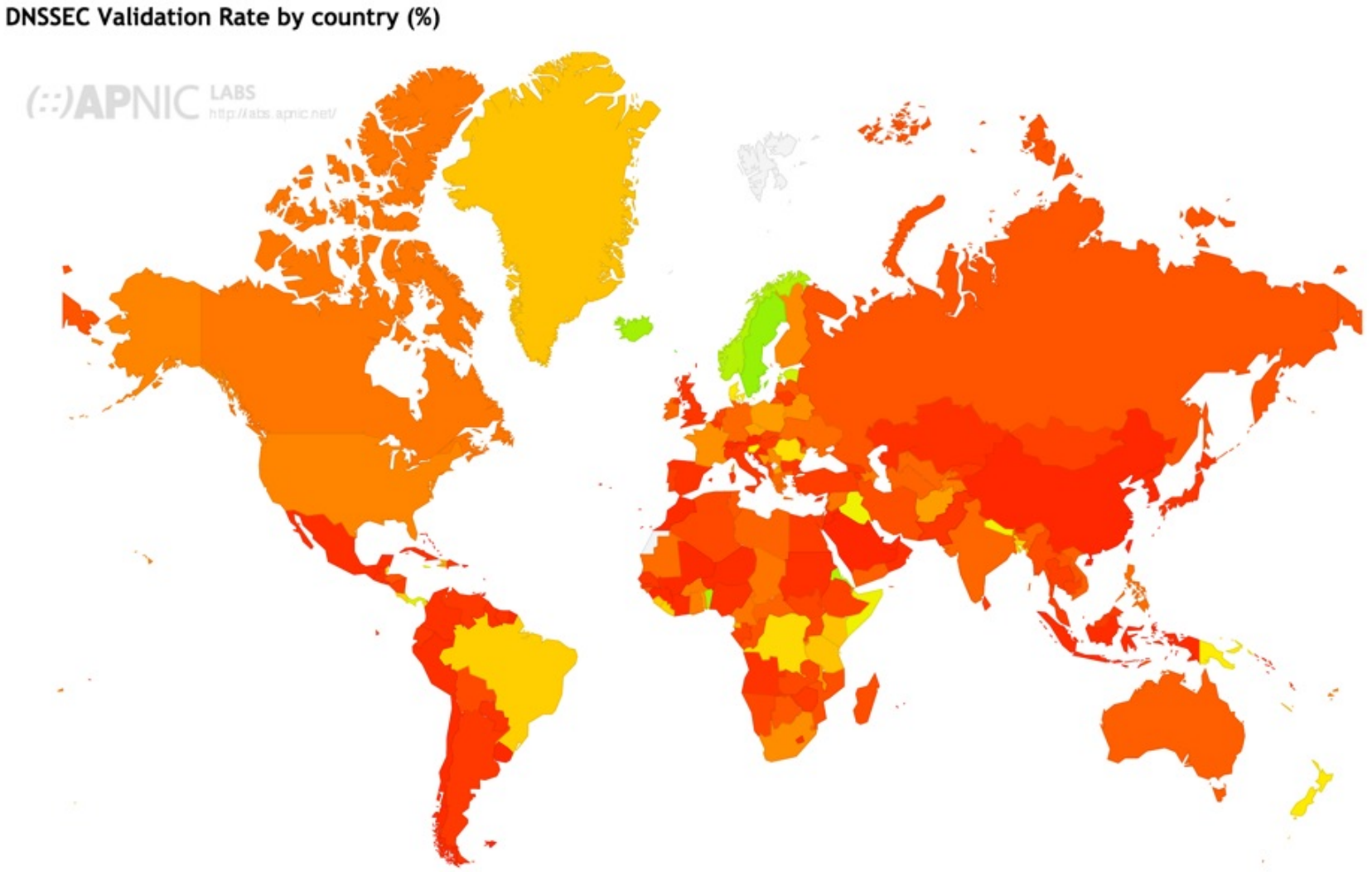
The Two Parts of DNSSEC



Use of DNSSEC Validation for World (XA)



http://stats.labs.apnic.net/dnssec/XA?c=XA&x=1&g=0&r=0&w=7&r=1

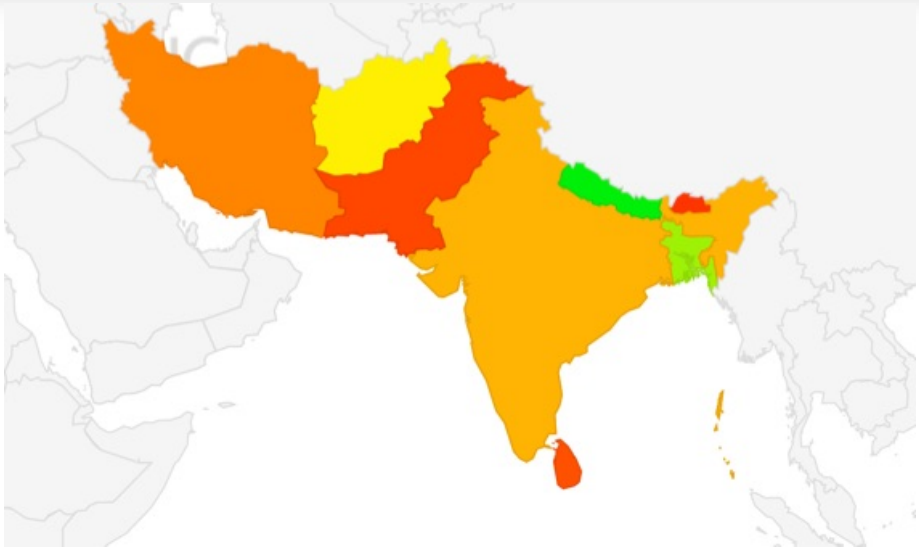


http://stats.labs.apnic.net/dnssec

Code	SubRegion	DNSSEC Validates	Uses Google PDNS
QQ	Melanesia, Oceania	35.23%	27.69%
XH	Eastern Africa, Africa	32.99%	29.26%
XK	Southern Africa, Africa	31.05%	15.81%
XQ	Northern America, Americas	25.44%	8.80%
QM	Northern Europe, Europe	22.68%	4.44%
QP	Australia and New Zealand, Oceania	21.59%	4.32%
QO	Western Europe, Europe	21.58%	6.33%
XT	Southern Asia, Asia	21.24%	23.82%
XP	South America, Americas	21.17%	15.17%
XW	Eastern Europe, Europe	20.27%	14.25%
XI	Middle Africa, Africa	15.33%	33.23%
XU	South-Eastern Asia, Asia	13.02%	16.01%
XN	Caribbean, Americas	12.94%	14.87%
XR	Central Asia, Asia	11.37%	14.52%
QN	Southern Europe, Europe	11.04%	10.38%
XV	Western Asia, Asia	10.84%	12.64%
QR	Micronesia, Oceania	10.49%	26.55%
XJ	Northern Africa, Africa	8.67%	16.94%
XO	Central America, Americas	7.51%	16.58%
XL	Western Africa, Africa	7.01%	34.79%
XS	Eastern Asia, Asia	2.64%	5.46%
QS	Polynesia, Oceania	2.23%	7.25%

http://stats.labs.apnic.net/dnssec/XA?c=XA&x=1&g=1&r=0&w=7&r=1

CC	Country	DNSSEC Validates	Uses Google PDNS
NP	Nepal, Southern Asia, Asia	55.47%	12.52%
BD	Bangladesh, Southern Asia, Asia	39.89%	45.23%
AF	Afghanistan, Southern Asia, Asia	27.67%	48.60%
IN	India, Southern Asia, Asia	20.47%	21.25%
MV	Maldives, Southern Asia, Asia	16.50%	24.95%
IR	Iran (Islamic Republic of), Southern Asia, Asia	14.91%	27.21%
LK	Sri Lanka, Southern Asia, Asia	8.36%	15.18%
PK	Pakistan, Southern Asia, Asia	6.79%	13.71%
BT	Bhutan, Southern Asia, Asia	3.95%	6.18%



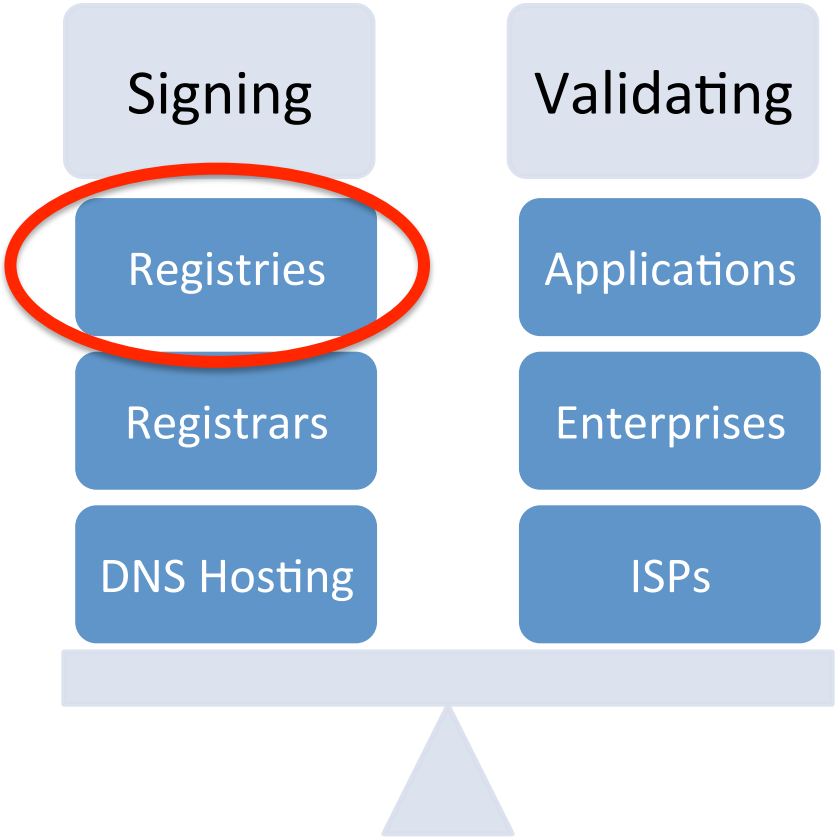
Note: Minimal use of Google PDNS in some countries (this means DNSSEC support by local ISPs)

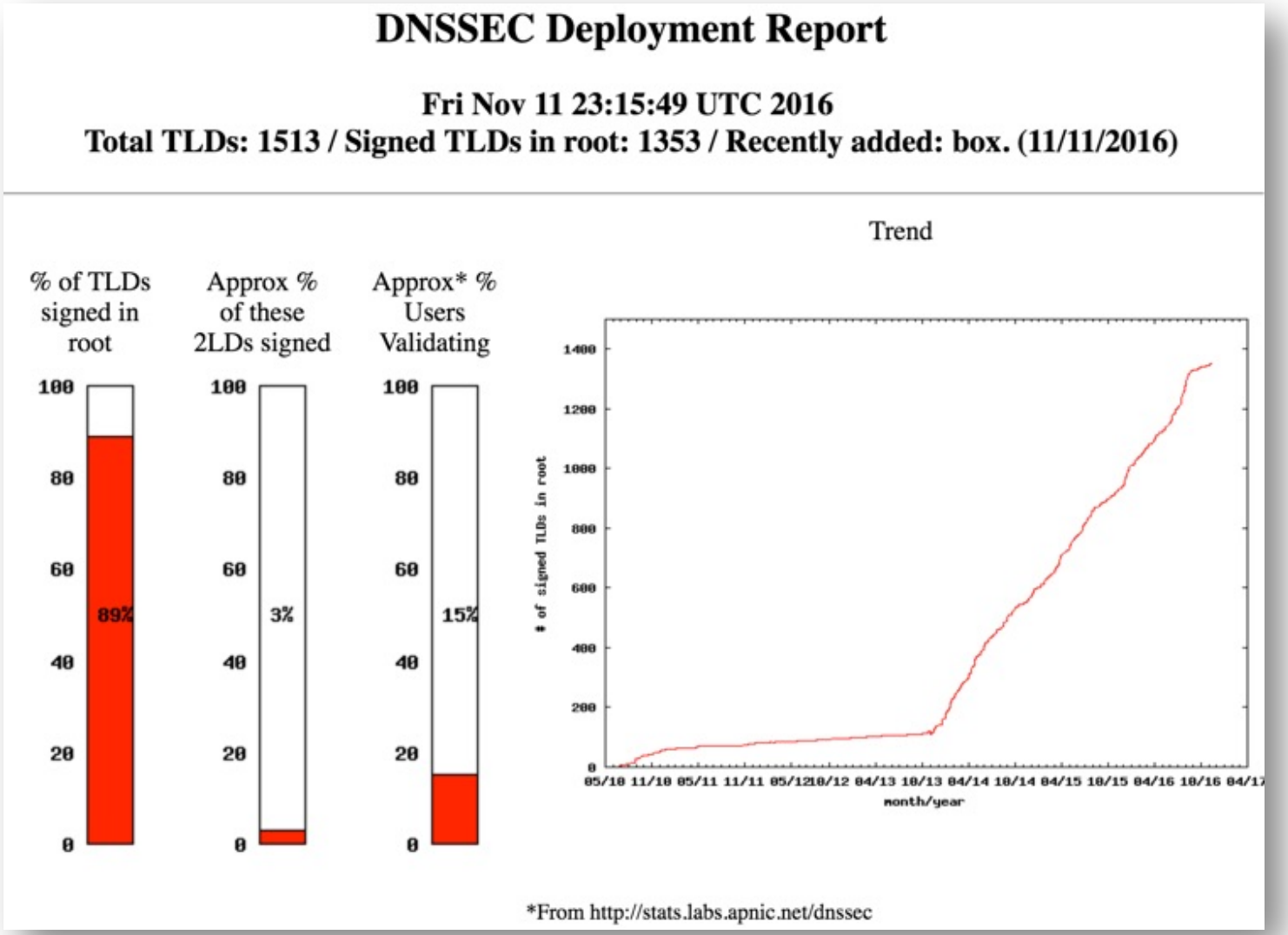
http://stats.labs.apnic.net/dnssec/XT?o=cXAw7x1g1r1

CC	Country	DNSSEC Validates	Uses Google PDNS	Samples
HK	Hong Kong Special Administrative Region of China, Eastern Asia, Asia	15.72%	8.93%	1,659,780
MN	Mongolia, Eastern Asia, Asia	8.63%	11.57%	983,698
JP	Japan, Eastern Asia, Asia	6.70%	5.33%	3,442,996
KP	Democratic People's Republic of Korea, Eastern Asia, Asia	5.00%	76.65%	1,139
KR	Republic of Korea, Eastern Asia, Asia	3.24%	4.93%	2,926,084
MO	Macao Special Administrative Region of China, Eastern Asia, Asia	3.17%	3.60%	477,158
TW	Taiwan, Eastern Asia, Asia	2.34%	9.85%	7,502,603
CN	China, Eastern Asia, Asia	1.70%	5.40%	40,784,442

http://stats.labs.apnic.net/dnssec/XS?o=cXAw7x1g1r1

The Two Parts of DNSSEC

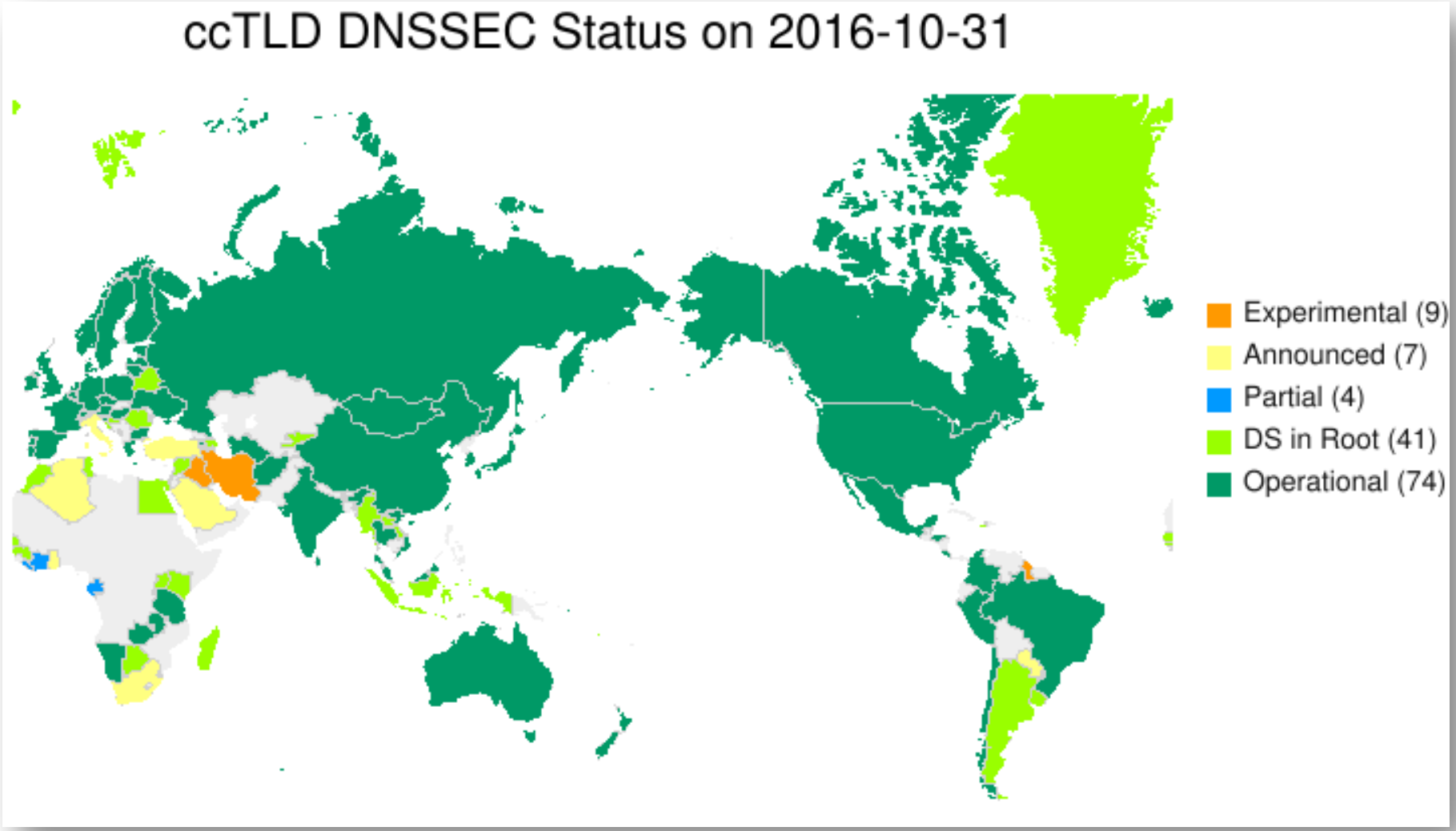


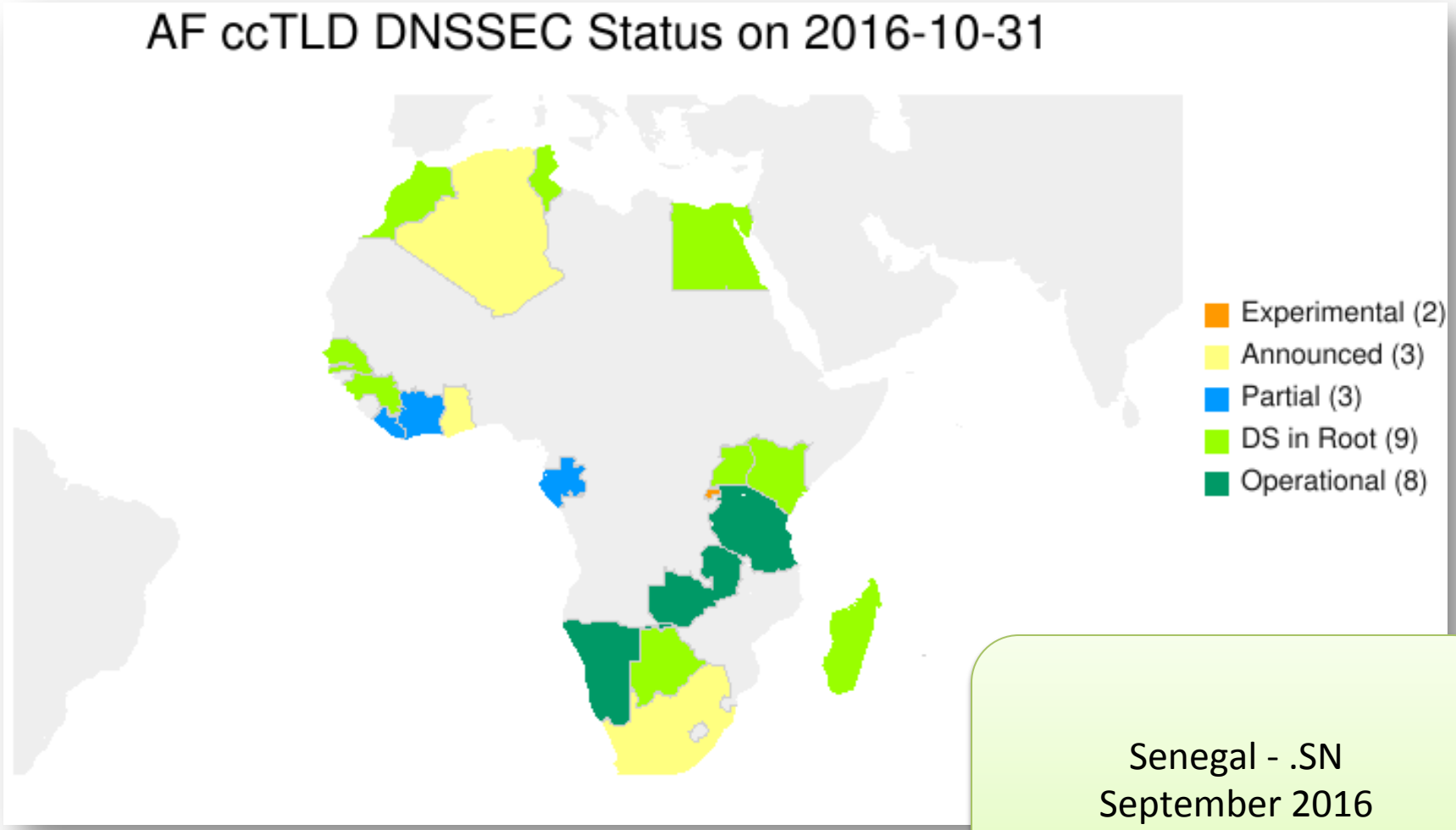


89% of TLDs signed

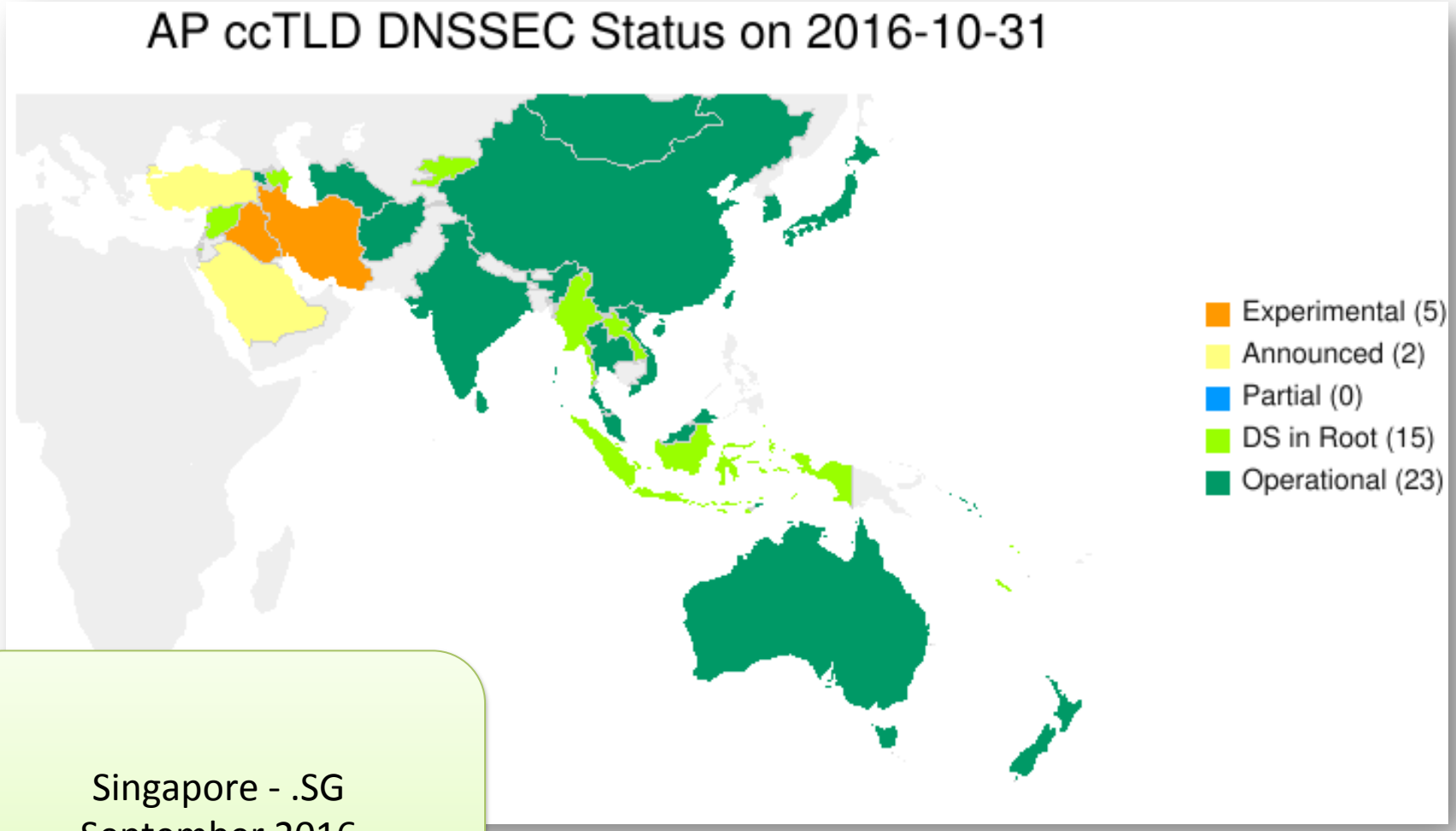
https://rick.eng.br/dnssecstat/

TLD DNSSEC Implementation Status

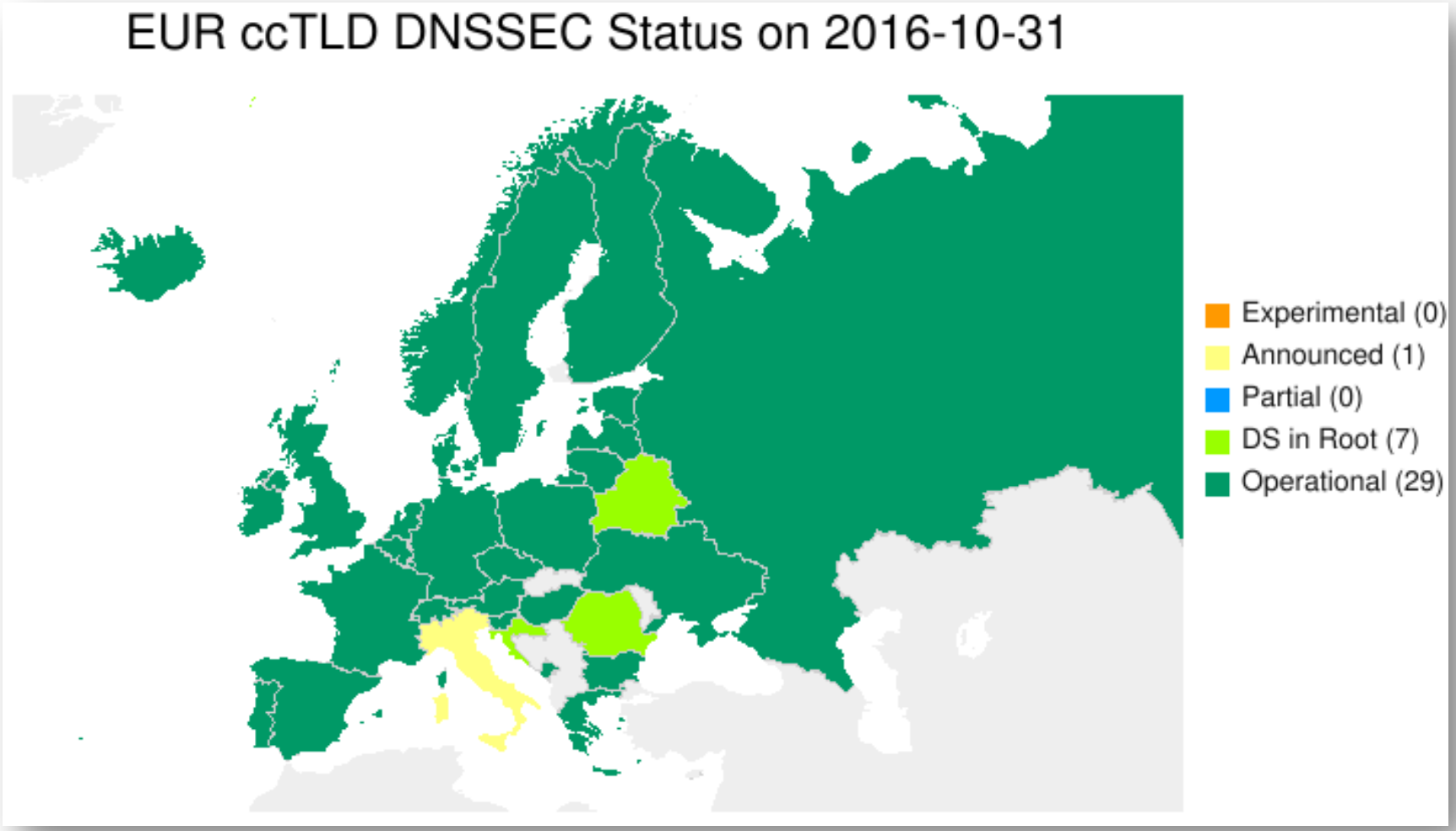

ccTLD DNSSEC Status on 2016-10-31
Experimental (9)
Announced (7)
Partial (4)
DS in Root (41)
Operational (74)

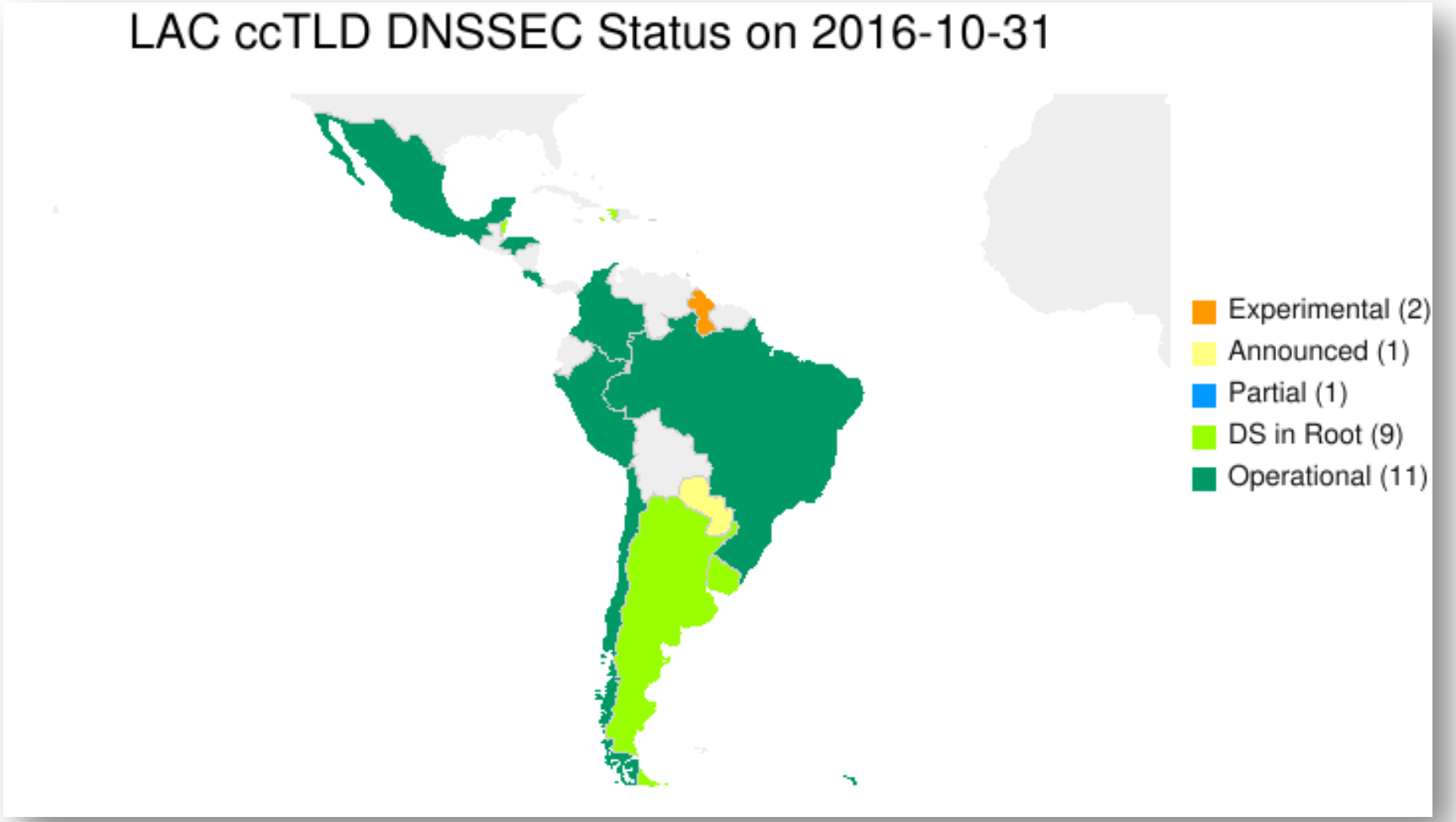


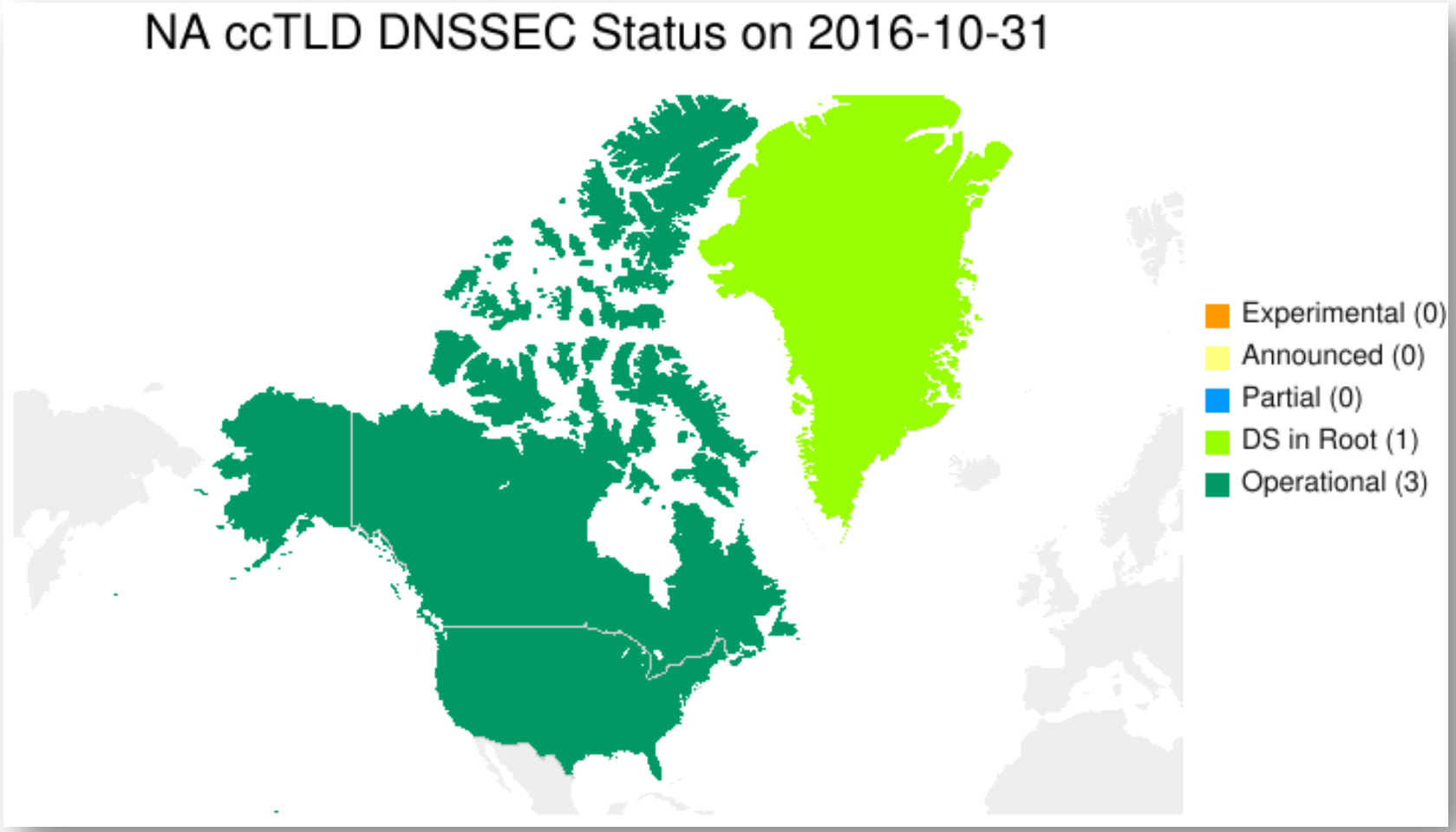
Senegal - .SN
September 2016



Singapore - .SG
September 2016


EUR ccTLD DNSSEC Status on 2016-10-31
Experimental (0)
Announced (1)
Partial (0)
DS in Root (7)
Operational (29)


LAC ccTLD DNSSEC Status on 2016-10-31
Experimental (2)
Announced (1)
Partial (1)
DS in Root (9)
Operational (11)


NA ccTLD DNSSEC Status on 2016-10-31
Experimental (0)
Announced (0)
Partial (0)
DS in Root (1)
Operational (3)

Receiving the DNSSEC Deployment Maps

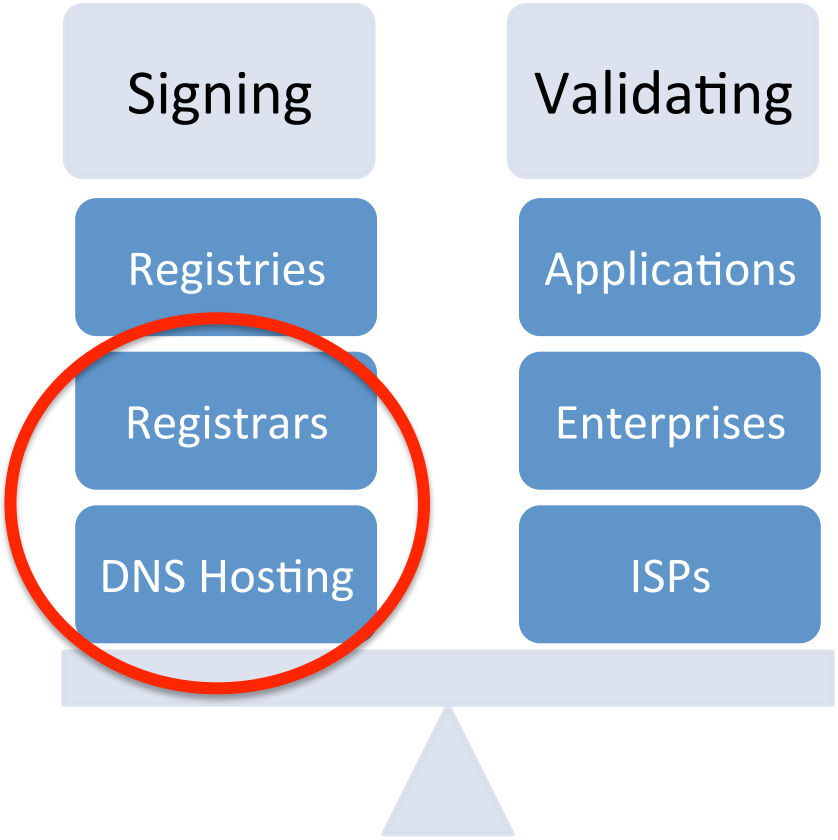
The DNSSEC Deployment Maps are published via email every Monday morning through the Internet Society Deploy360 Programme.

To subscribe, visit:

www.internetsociety.org/deploy360/dnssec/maps/

Please send update requests to york@isoc.org

The Two Parts of DNSSEC



TLD		Description	DS Date	% Signed	Signed/Total
nl.		SIDN (Stichting Internet Domeinregistratie Nederland)	11-NOV-2010	44.92	2546766/5669950
se.		The Internet Infrastructure Foundation	27-AUG-2010	51.16	663356/1296561
cz.		CZ.NIC, z.s.p.o	24-JUN-2010	49.85	636543/1276966
com.		VeriSign Global Registry Services	31-MAR-2011	0.48	617248/127372962
no.		UNINETT Norid A/S	15-NOV-2014	58.21	414872/712709
net.		VeriSign Global Registry Services	9-DEC-2010	0.66	103278/15746374
org.		Public Interest Registry (PIR)	22-JUL-2010	0.68	73353/10741575
nu.		The IUSN Foundation	25-SEP-2010	22.17	69610/313997
info.		Afilias Limited	4-SEP-2010	0.49	26604/5444142
hu.		Council of Hungarian Internet Providers (CHIP)	22-FEB-2015	3.54	24685/697541
ovh.		OVH SAS	19-JUN-2014	38.21	20187/52831
biz.		Neustar, Inc.	7-AUG-2010	0.80	18018/2262408
xyz.		XYZ.COM LLC	19-FEB-2014	0.15	9257/6157254
webcam.		dot Webcam Limited	20-MAR-2014	18.97	7467/39356
amsterdam.		Gemeente Amsterdam	25-DEC-2014	23.26	5693/24473
top.		Jiangsu Bangning Science & Technology Co.,Ltd.	4-AUG-2014	0.12	4634/3987895
frl.		FRLregistry B.V.	31-AUG-2014	26.95	3761/13958
paris.		City of Paris	19-APR-2014	15.26	3253/21322
bank.		fTLD Registry Services, LLC	9-JAN-2015	100.00	2960/2960
online.		DotOnline Inc.	16-MAR-2015	0.40	1807/456871
name.		VeriSign Information Services, Inc.	24-JAN-2014	1.00	1590/159433
immo.		Auburn Bloom, LLC	27-AUG-2014	9.15	1129/12335
cloud.		ARUBA PEC S.p.A.	26-JUN-2015	1.39	1085/78260

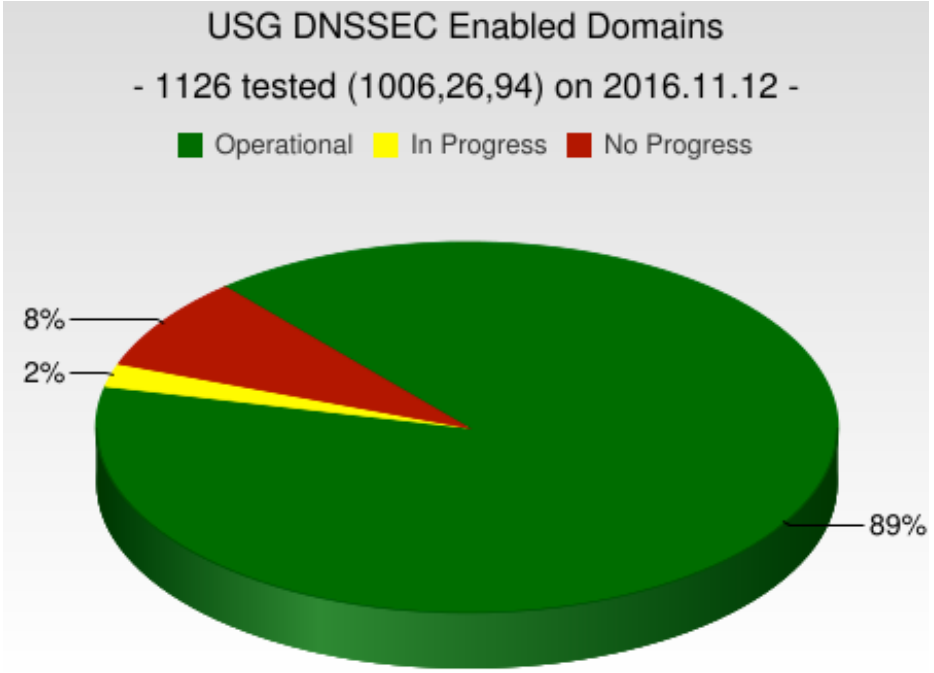
https://rick.eng.br/dnssecstat/

12/11/2016

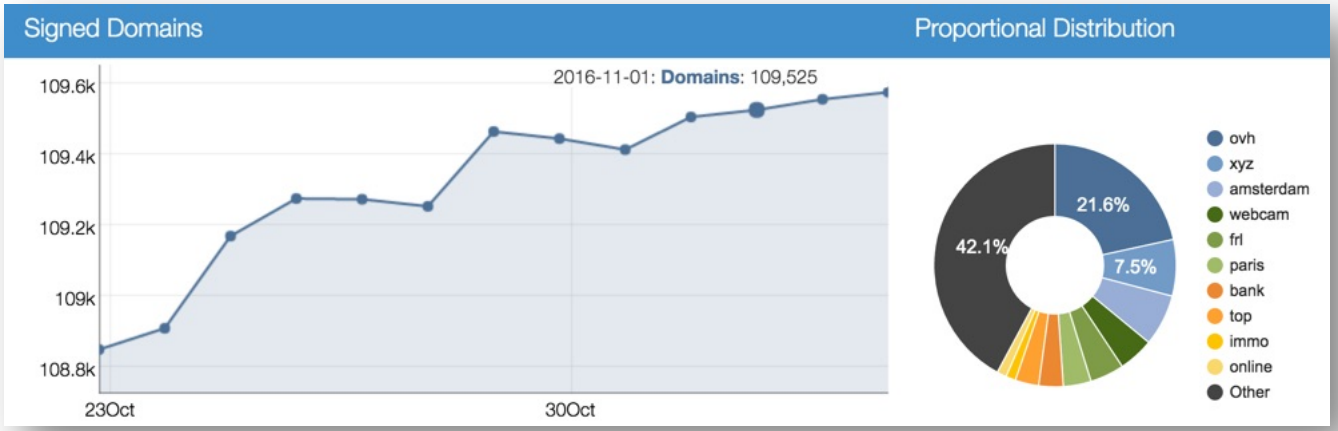
3.913.274 .br

IDNA **8.323** DNSSEC **953.486**

http://registro.br/estatisticas.html
24% signed



https://fedv6-deployment.antd.nist.gov/snap-all.html



Registrar Breakdown

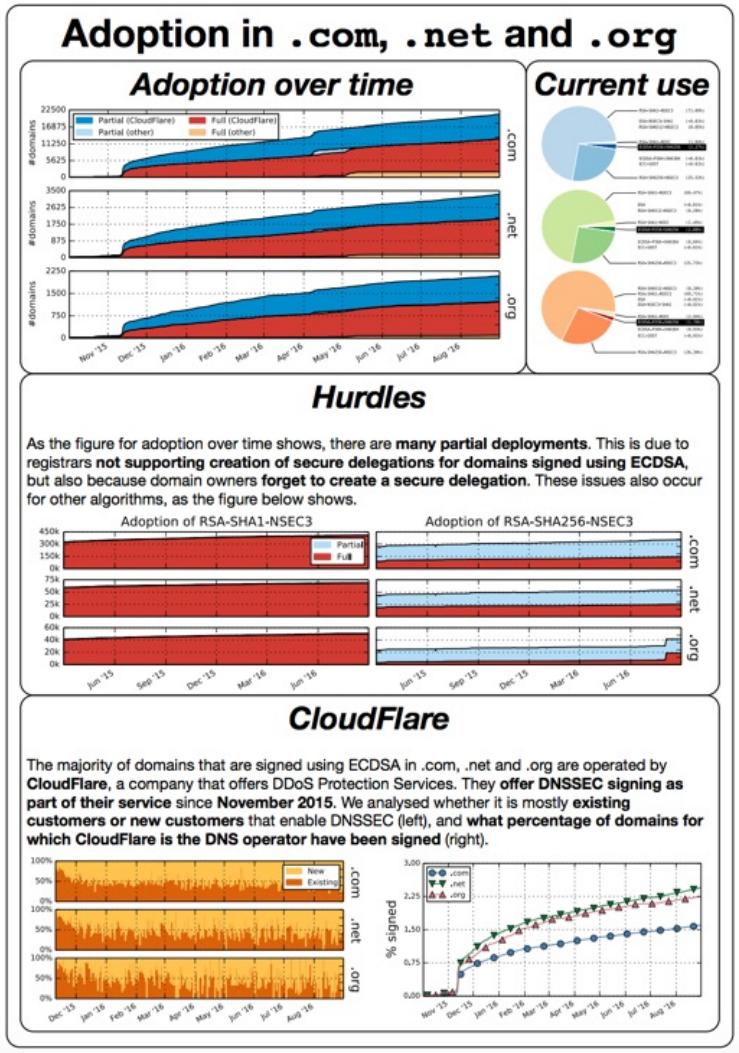
	Registrar	Domains	% Share
1.	OVH sas	45,715	41.72%
2.	Key-Systems, LLC (KeyDrive Group)	9,890	9.03%
3.	Mijndomein.nl BV	6,302	5.75%
4.	Domeneshop AS dba domainnameshop.com	4,764	4.35%
5.	EnCirca, Inc.	2,026	1.85%
6.	NameCheap, Inc.	912	0.83%
7.	Hosting Concepts B.V. d/b/a Openprovider	853	0.78%
8.	Global Village GmbH	452	0.41%
9.	Gandi SAS	345	0.31%
10.	GoDaddy.com, LLC (GoDaddy Group)	272	0.25%

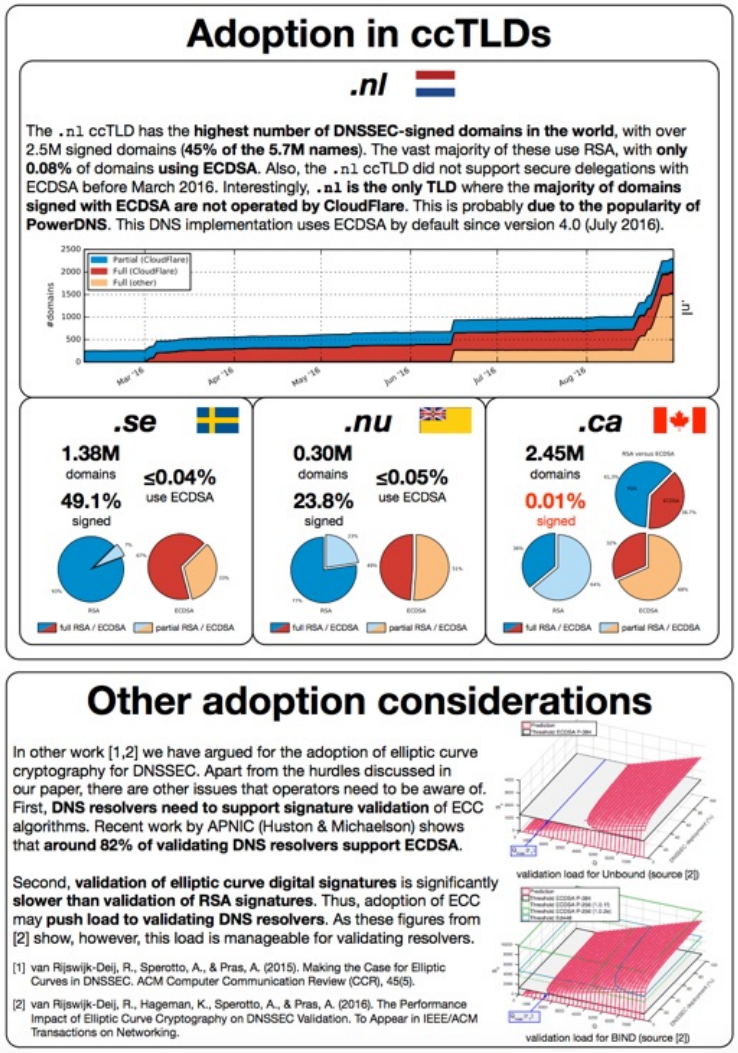
TLD Breakdown

	new gTLD	Domains	% Share
1.	.ovh	15,892	14.50%
2.	.xyz	5,528	5.04%
3.	.amsterdam	5,041	4.60%
4.	.webcam	3,459	3.16%
5.	.frl	3,350	3.06%
6.	.paris	2,727	2.49%
7.	.bank	2,393	2.18%
8.	.top	2,313	2.11%
9.	.immo	962	0.88%
10.	.online	947	0.86%
11.	.win	876	0.80%
12.	.bzh	789	0.72%

https://ntldstats.com/dnssec

ECDSA Adoption





[1] van Rijswijk-Deij, R., Sperotto, A., & Pras, A. (2015). Making the Case for Elliptic Curves in DNSSEC. ACM Computer Communication Review (CCR), 45(5).

[2] van Rijswijk-Deij, R., Hageman, K., Sperotto, A., & Pras, A. (2016). The Performance Impact of Elliptic Curve Cryptography on DNSSEC Validation. To Appear in IEEE/ACM Transactions on Networking.

http://wwwhome.ewi.utwente.nl/~rijswijkrm/pub/cnsm2016-poster.pdf

DANE

DANE for SMTP Statistics

Viktor Dukhovni reported on 11 Oct 2016:

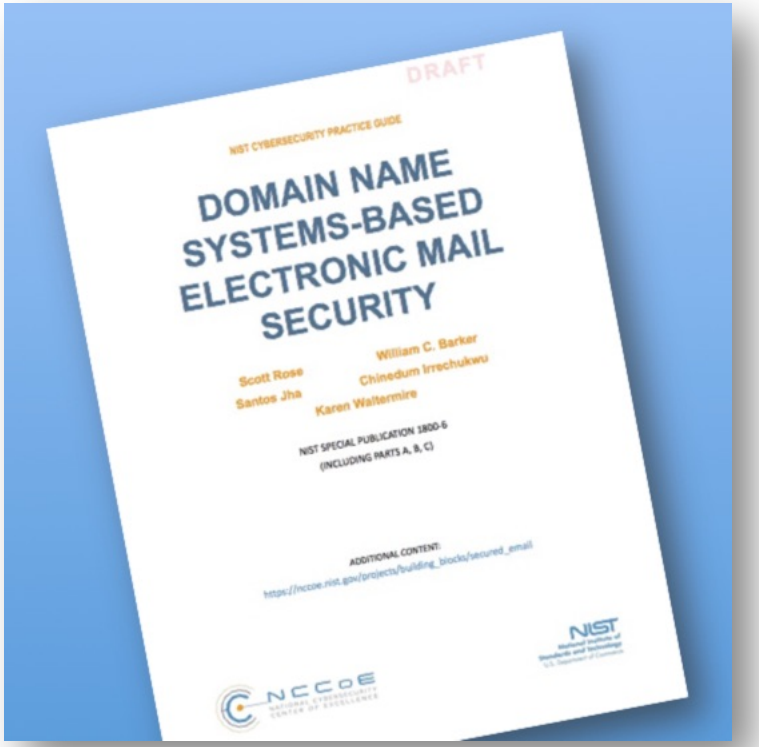
- Over 102,000 domains with TLSA records for SMTP
- Served by ~2,200 MX hosts

- 81 DANE-validated domains have sufficient volume to appear in Google's email transparency report (up from 24 one year previously)

Source: message to IETF DANE Working Group mailing list – 11 Oct 2016

Speaking of DANE for SMTP…

NIST published Special Publication 1800-6, "**DNS-Based E-Mail Security**"



- DNSSEC, DANE, SMIMEA

- Read more:
- https://nccoe.nist.gov/projects/building_blocks/secured_email

Summary

- DNSSEC Validation – 14% global, but flat
- DNSSEC Signing
  - 89% of all TLDs signed
  - Second-level domains range from 2.5 million .NL (45%) and ~1 million .BR (24%) and 89% .GOV down to 0.5% .COM
- DANE – seeing success with email encryption
- More work to be done!

Thank you!

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http://www.internetsociety.org/deploy360/dnssec/