

Reporting on Route Objects and ROA Validation



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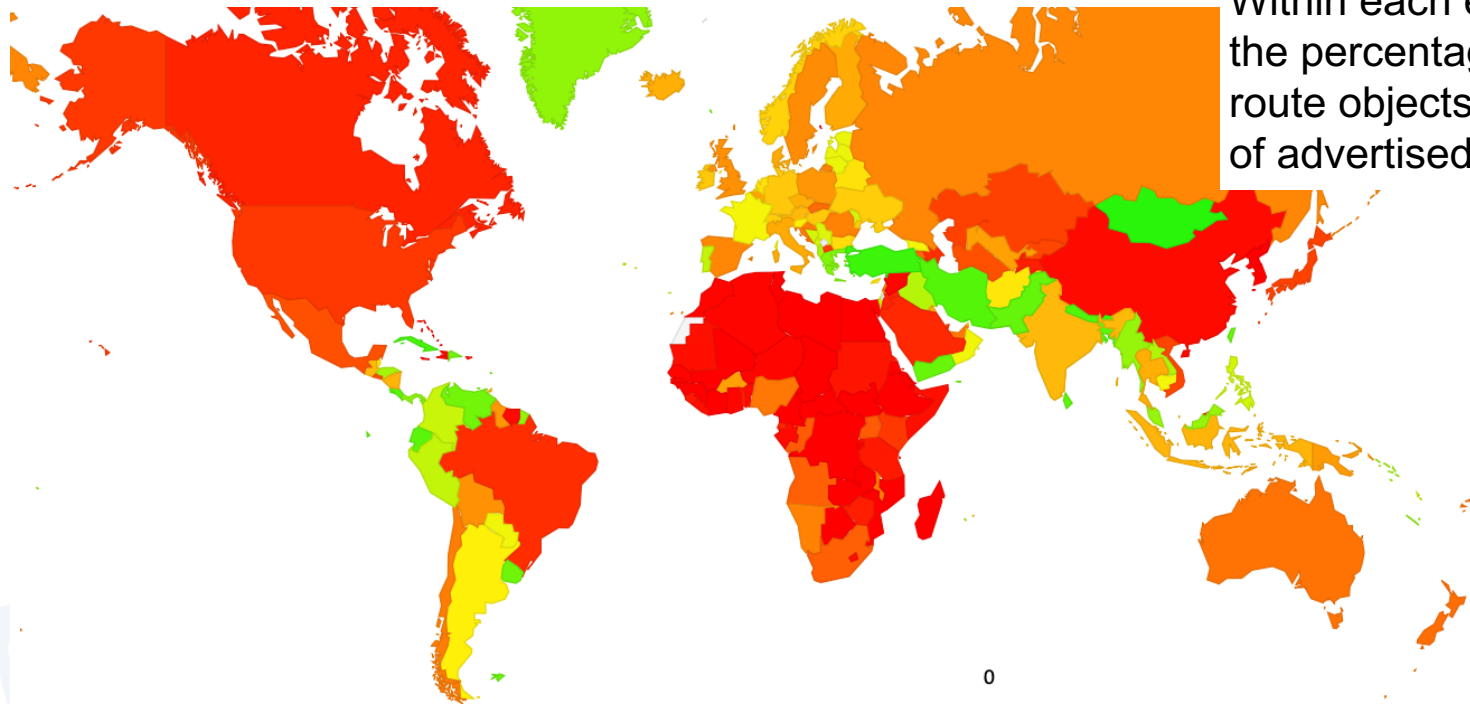
Within each economy, and within each network, what's the extent of publication of ROAs to allow validation of route objects?

How many of these advertised routes are valid, invalid and unknown?

What about if we looked at advertised address spans rather than just route objects?

How about IPv4 and IPv6 routes?

<https://stats.labs.apnic.net/roas>



Within each economy what's the percentage of ROA-valid route objects of the total count of advertised route objects?



https://stats.labs.apnic.net/roas

And display the dataset used to generate the map

Code	Region	V4 Valid	Pc	V4 Invalid	Pc	V4 Unknwn	Pc	V4 Total Routes	V6 Valid	Pc	V6 Invalid	Pc	V6 Unknwn	Pc	V6 Total Routes
XA	World	232,895	26.8%	2,180	0.3%	633,442	72.9%	868,517	32,452	29.4%	518	0.5%	77,480	70.1%	110,450
XB	Africa	2,979	10.1%	33	0.1%	26,592	89.8%	29,604	314	21.5%	7	0.5%	1,138	78.0%	1,459
XC	Americas	63,203	17.1%	773	0.2%	304,899	82.7%	368,875	11,976	24.0%	154	0.3%	37,759	75.7%	49,889
XD	Asia	95,302	36.0%	961	0.4%	168,372	63.6%	264,635	9,337	27.4%	252	0.7%	24,442	71.8%	34,031
XE	Europe	64,802	36.4%	332	0.2%	113,022	63.4%	178,156	10,207	46.1%	61	0.3%	11,873	53.6%	22,141
XF	Oceania	6,604	24.2%	81	0.3%	20,548	75.5%	27,233	611	20.9%	44	1.5%	2,267	77.6%	2,922
XG	Unclassified	5	35.7%	0	0.0%	9	64.3%	14	7	87.5%	0	0.0%	1	12.5%	8

Code	Region	V4 Valid	Pc	V4 Invalid	Pc	V4 Unknwn	Pc	V4 Total Routes	V6 Valid	Pc	V6 Invalid	Pc	V6 Unknwn	Pc	V6 Total Routes
QM	Northern Europe, Europe	10,884	34.4%	45	0.1%	20,750	65.5%	31,679	2,123	46.1%	15	0.3%	2,469	53.6%	4,607
QN	Southern Europe, Europe	11,182	35.5%	63	0.2%	20,244	64.3%	31,489	887	30.5%	5	0.2%	2,017	69.3%	2,909
QO	Western Europe, Europe	18,729	43.8%	97	0.2%	23,938	56.0%	42,764	5,080	53.2%	30	0.3%	4,441	46.5%	9,551
QP	Australia and New Zealand, Oceania	6,281	24.0%	72	0.3%	19,810	75.7%	26,163	586	20.4%	43	1.5%	2,237	78.1%	2,866
QR	Melanesia, Oceania	186	42.7%	9	2.1%	241	55.3%	436	14	51.9%	1	3.7%	12	44.4%	27
QQ	Micronesia, Oceania	39	19.3%	0	0.0%	163	80.7%	202	7	58.3%	0	0.0%	5	41.7%	12

Code	Region	V4 Valid	Pc	V4 Invalid	Pc	V4 Unknwn	Pc	V4 Total Routes	V6 Valid	Pc	V6 Invalid	Pc	V6 Unknwn	Pc	V6 Total Routes
US	United States of America, Northern America, Americas	25,707	11.7%	459	0.2%	193,606	88.1%	219,772	4,597	18.6%	34	0.1%	20,121	81.3%	24,752
BR	Brazil, South America, Americas	5,715	9.7%	24	0.0%	53,286	90.3%	59,025	1,624	11.3%	36	0.3%	12,711	88.4%	14,371
CN	China, Eastern Asia, Asia	1,082	2.5%	86	0.2%	42,468	97.3%	43,636	255	2.3%	28	0.3%	10,911	97.5%	11,194
IN	India, Southern Asia, Asia	15,149	38.4%	257	0.7%	24,023	60.9%	39,429	2,855	41.8%	61	0.9%	3,913	57.3%	6,829
RU	Russian Federation, Eastern Europe, Europe	9,759	28.1%	57	0.2%	24,866	71.7%	34,682	822	38.8%	10	0.5%	1,289	60.8%	2,121
AU	Australia, Australia and New Zealand, Oceania	5,501	24.2%	67	0.3%	17,196	75.5%	22,764	449	18.5%	42	1.7%	1,931	79.7%	2,422
CA	Canada, Northern America, Americas	1,519	7.1%	15	0.1%	19,750	92.8%	21,284	345	25.1%	0	0.0%	1,029	74.9%	1,374
KR	Republic of Korea, Eastern Asia, Asia	106	0.5%	0	0.0%	19,734	99.5%	19,840	56	12.0%	0	0.0%	411	88.0%	467
MX	Mexico, Central America, Americas	3,279	16.9%	10	0.1%	16,094	83.0%	19,383	3,088	65.4%	2	0.0%	1,634	34.6%	4,724
TR	Turkey, Western Asia, Asia	18,043	94.5%	5	0.0%	1,049	5.5%	19,097	485	79.1%	2	0.3%	126	20.6%	613
GB	United Kingdom of Great Britain and Northern Ireland, Northern Europe, Europe	4,859	29.9%	17	0.1%	11,387	70.0%	16,263	940	43.5%	2	0.1%	1,218	56.4%	2,160
ES	Spain, Southern Europe, Europe	4,467	27.7%	28	0.2%	11,657	72.2%	16,152	198	11.0%	0	0.0%	1,603	89.0%	1,801
ID	Indonesia, South-Eastern Asia, Asia	5,919	36.9%	65	0.4%	10,058	62.7%	16,042	650	42.2%	26	1.7%	864	56.1%	1,540
DE	Germany, Western Europe, Europe	6,436	40.7%	38	0.2%	9,328	59.0%	15,802	1,804	54.8%	19	0.6%	1,466	44.6%	3,289
HK	Hong Kong Special Administrative Region of China, Eastern Asia, Asia	3,979	27.4%	46	0.3%	10,520	72.3%	14,545	307	41.6%	12	1.6%	419	56.8%	738
JP	Japan, Eastern Asia, Asia	1,708	13.9%	9	0.1%	10,574	86.0%	12,291	252	20.5%	0	0.0%	980	79.5%	1,232
AR	Argentina, South America, Americas	5,910	48.7%	74	0.6%	6,148	50.7%	12,132	473	43.0%	11	1.0%	616	56.0%	1,100
VN	Vietnam, South-Eastern Asia, Asia	1,768	14.8%	1	0.0%	10,151	85.2%	11,920	23	1.0%	1	0.0%	2,368	99.0%	2,392
UA	Ukraine, Eastern Europe, Europe	4,746	42.0%	10	0.1%	6,546	57.9%	11,302	304	43.4%	0	0.0%	397	56.6%	701
NL	Netherlands, Western Europe, Europe	4,284	45.9%	14	0.1%	5,039	54.0%	9,337	1,422	57.5%	4	0.2%	1,048	42.4%	2,474

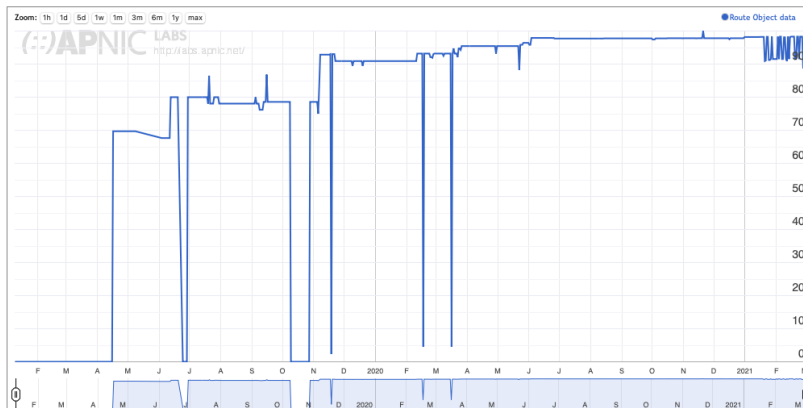


Country View



Use of ROAs for Bhutan (BT)

Display: ROAs (Advertised ROA-Valid Route Advertisements), IPv4, Percent (of Total)



ROAs Valid IPv4 Percent

Hide country ASN List

Hide Regional Use

Redraw

AS	AS Name	V4 Valid	Pc	V4 Invalid	Pc	V4 Unkwn	Pc	V4 Total Routes	V6 Valid	Pc	V6 Invalid	Pc	V6 Unkwn	Pc	V6 Total Routes
AS23955	TASHICELL-DOMESTIC-AS TashiCell Domestic AS, Thimphu, Bhutan	12	100.0%	0	0.0%	0	0.0%	12	24	100.0%	0	0.0%	0	0.0%	24
AS134715	DRUKREN-MOIC-AS Ministry of Information & Communications Thimphu, Bhutan	9	100.0%	0	0.0%	0	0.0%	9	6	100.0%	0	0.0%	0	0.0%	6
AS18024	BTTELECOM-AS-AP Bhutan Telecom Ltd	5	83.3%	1	16.7%	0	0.0%	6	2	100.0%	0	0.0%	0	0.0%	2
AS136039	NANO-AS-AP NANO, Bhutan	6	100.0%	0	0.0%	0	0.0%	6	1	100.0%	0	0.0%	0	0.0%	1
AS17660	DRUKNET-AS DrukNet ISP	5	100.0%	0	0.0%	0	0.0%	5	2	100.0%	0	0.0%	0	0.0%	2
AS135666	MOIC-AS-AP Government Data Center (DITT/MoIC)	4	100.0%	0	0.0%	0	0.0%	4	1	100.0%	0	0.0%	0	0.0%	1
AS141680		3	100.0%	0	0.0%	0	0.0%	3	1	100.0%	0	0.0%	0	0.0%	1
AS13335	CLOUDFLARENET	1	50.0%	0	0.0%	1	50.0%	2	1	100.0%	0	0.0%	0	0.0%	1
AS18025	BTTELECOM-AS-AP Bhutan Telecom Ltd	1	50.0%	1	50.0%	0	0.0%	2	0	0.0%	0	0.0%	0	0.0%	0
AS7615	BTIX-AS-AP Bhutan Internet Exchange	1	100.0%	0	0.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%	1
AS9009	M247	1	100.0%	0	0.0%	0	0.0%	1	0	0.0%	0	0.0%	0	0.0%	0
AS38004	FASTLINK-ISP FastLink Wireless ISP, DrukCom Pvt. Enterprise.	1	100.0%	0	0.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%	1
AS44444	FORCEPOINT-CLOUD-AS	1	100.0%	0	0.0%	0	0.0%	1	0	0.0%	0	0.0%	0	0.0%	0
AS132232	DCS-AS Data Centre Services	1	100.0%	0	0.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%	1
AS137412	TASHICELL-MOBILE-AS Tashicell Domestic AS Thimphu Bhutan	1	100.0%	0	0.0%	0	0.0%	1	3	100.0%	0	0.0%	0	0.0%	3
AS137925	GIC-BHUTAN-AS-AP GIC-Bhutan Rainsurance Co Ltd	1	100.0%	0	0.0%	0	0.0%	1	1	100.0%	0	0.0%	0	0.0%	1



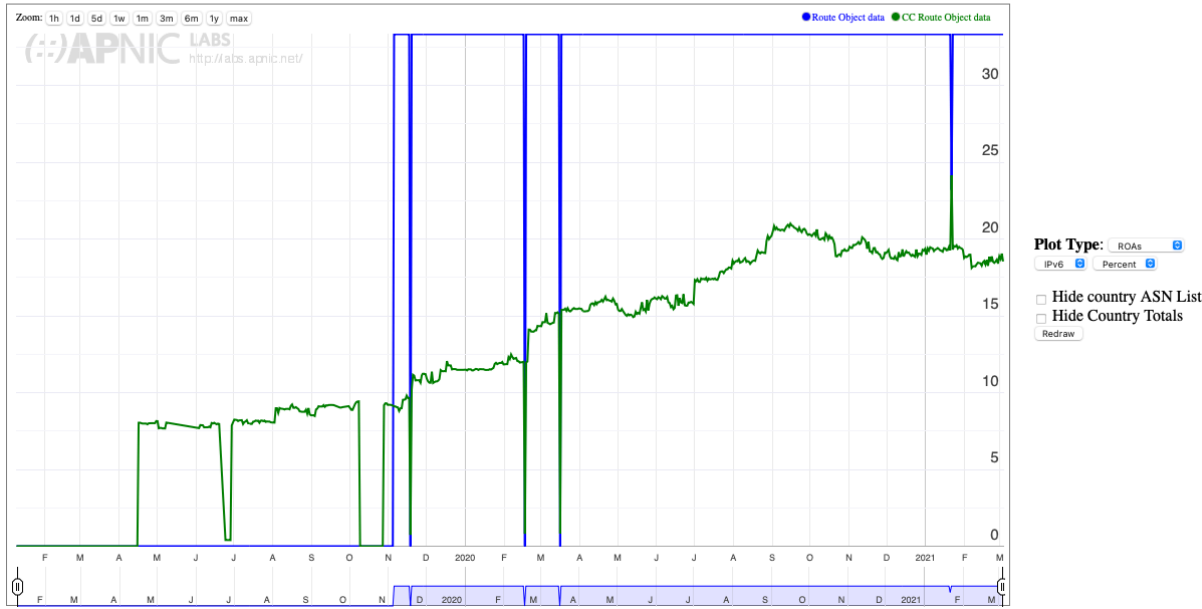
APRICOT 2021
APNIC 51

Network (ASN) View



RPKI ROA-Validation of Advertised Routes for AS1221: ASN-TELSTRA Telstra Corporation Ltd, Australia (AU)

Display: ROAs (Advertised ROA-Validated Route Advertisements), IPv6, Percent (of Total)



<https://stats.labs.apnic.net/roas>

- It's still being developed (and debugged!)
- Please let me know if you have suggestions, comments, bug reports, etc

Email: [research \(a\) apnic.net](mailto:research@apnic.net)

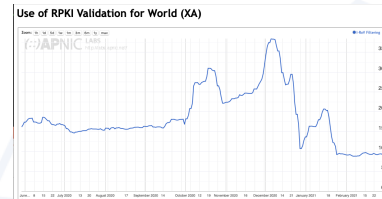
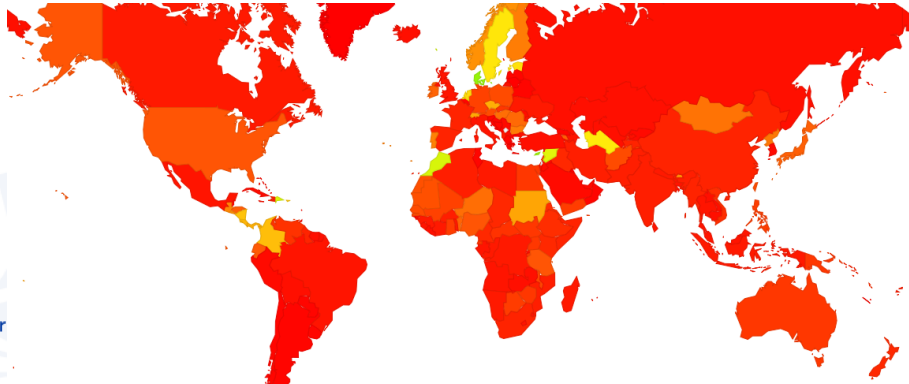


By the way...



How well are economies and networks doing with drop-invalid ROV filtering?

<https://stats.labs.apnic.net/rpki> tracks our progress in deployment of ROV filter tools to drop ROV-invalid routes



Questions?

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ONLINE

22 February – 4 March 2021

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