



Internet Routing Table Analysis Update

Philip Smith

SANOG 36

19th January 2021

Virtual Event



Motivation

- 1998: No one was publishing any Internet routing table analysis
 - Only CIDR-Report reporting on top 20 contributors to routing table, and top 20 bad aggregators
- With support of APNIC, my weekly report started from 23rd February 1999:
 - Routing table size
 - CIDR-Report style reporting on a per-RIR basis
 - ...and many other interesting features
- Started recording global IPv6 table in September 2010

IPv4 Routing Report 18th January 2021

BGP routing table entries examined:	837040
Prefixes after maximum aggregation (per Origin AS):	321122
Deaggregation factor:	2.61
Unique aggregates announced (without unneeded subnets):	400860
Total ASes present in the Internet Routing Table:	70309
Prefixes per ASN:	11.91
Origin-only ASes present in the Internet Routing Table:	60480
Origin ASes announcing only one prefix:	25031
Transit ASes present in the Internet Routing Table:	9829
Transit-only ASes present in the Internet Routing Table:	302
Average AS path length visible in the Internet Routing Table:	4.4
Max AS path length visible:	34
Max AS path prepend of ASN (135582)	32
Prefixes from unregistered ASNs in the Routing Table:	884
Number of instances of unregistered ASNs:	886
Special use prefixes present in the Routing Table:	1
Prefixes being announced from unallocated address space:	440
Number of addresses announced to Internet:	2865063296
Equivalent to 170 /8s, 197 /16s and 101 /24s	
Total number of prefixes smaller than registry allocations:	284803

APNIC Region

Prefixes being announced by APNIC Region ASes:	219483
Total APNIC prefixes after maximum aggregation:	65073
APNIC Deaggregation factor:	3.37
Prefixes being announced from the APNIC address blocks:	215346
Unique aggregates announced from the APNIC address blocks:	88005
APNIC Region origin ASes present in the Internet Routing Table:	11210
APNIC Prefixes per ASN:	19.21
APNIC Region origin ASes announcing only one prefix:	3203
APNIC Region transit ASes present in the Internet Routing Table:	1600
Average APNIC Region AS path length visible:	4.7
Max APNIC Region AS path length visible:	34
Number of APNIC region 32-bit ASNs visible in the Routing Table:	6350
Number of APNIC addresses announced to Internet:	778298368
Equivalent to 46 /8s, 99 /16s and 228 /24s	
APNIC AS Blocks	4608-4864, 7467-7722, 9216-10239, 17408-18431
(pre-ERX allocations)	23552-24575, 37888-38911, 45056-46079, 55296-56319, 58368-59391, 63488-64098, 64297-64395, 131072-143673
APNIC Address Blocks	1/8, 14/8, 27/8, 36/8, 39/8, 42/8, 43/8, 49/8, 58/8 to 61/8, 101/8, 103/8, 106/8, 110/8 to 126/8, 133/8, 175/8, 180/8, 182/8, 183/8, 202/8, 203/8, 210/8, 211/8, 218/8 to 223/8

Global per AS prefix count summary

ASN	No of nets /20	equiv	Max Agg	Description
8151	8134	3400	589	Uninet S.A. de C.V., MX
47331	6289	867	3617	TTNET, TR
12479	6225	1667	141	UNI2-AS, ES
7545	5689	777	660	TPG-INTERNET-AP TPG Telecom Limited, AU
11492	4758	316	735	CABLEONE, US
4538	4736	4192	74	ERX-CERNET-BKB China Education and Rese
16509	4714	9084	2150	AMAZON-02, US
7155	4037	264	32	VIASAT-SP-BACKBONE, US
22773	3816	3016	227	ASN-CXA-ALL-CCI-22773-RDC, US
7552	3542	1330	19	VIETEL-AS-AP Viettel Group, VN
39891	3459	195	22	ALJAWWALSTC-AS, SA
20940	3403	3359	186	AKAMAI-ASN1, NL
10620	3388	526	603	Telmex Colombia S.A., CO
6327	3346	1318	80	SHAW, CA
7713	3235	952	519	TELKOMNET-AS-AP PT Telekomunikasi Indon
16625	3199	1674	2298	AKAMAI-AS, US
8551	3171	379	45	BEZEQ-INTERNATIONAL-AS Bezeqint Interne
12389	2875	2280	884	ROSTELECOM-AS, RU
45899	2865	1896	55	VNPT-AS-VN VNPT Corp, VN
9808	2779	9044	57	CMNET-GD Guangdong Mobile Communication

AfrINIC APNIC ARIN LACNIC RIPE NCC



Unassigned resources

- Use of unassigned address space is rampant
 - Currently 504 unassigned prefixes in IPv4 routing table
- Use of unassigned ASNs is also a big problem
 - Currently 1032 unassigned ASNs in use
- Many are transited by well known / reputable operators
 - Why??

List of Unregistered Origin ASNs

The complete list in use:

1631, 1636, 4879, 6485, 6565, 7124, 7363, 7837, 10425, 10926, 10931, 10981, 11011, 11044, 11207, 11223, 11247, 11316, 11480, 11490, 11636, 11825, 11945, 11969, 11974, 12017, 12071, 12077, 12122, 12176, 12195, 12232, 12240, 13224, 13313, 13317, 13334, 13339, 13492, 13583, 13701, 14076, 14350, 14428, 14439, 14461, 14478, 14552, 14594, 14651, 14797, 14880, 14889, 15037, 15115, 15132, 15182, 15200, 15220, 15329, 16554, 16581, 16615, 16636, 16666, 16734, 16753, 16769, 16804, 16808, 16903, 17387, 18493, 18512, 18548, 18549, 18604, 18691, 18781, 18796, 18805, 18940, 19081, 19140, 19142, 19176, 19330, 19359, 19521, 19533, 19606, 19658, 19700, 19708, 19926, 20089, 20118, 20190, 20200, 20421, 20438, 20443, 21584, 21665, 21666, 21695, 21714, 21861, 21986, 22063, 22160, 22271, 22272, 22280, 22338, 22484, 22538, 22539, 22613, 22649, 22694, 22733, 22736, 22743, 22774, 22830, 23061, 23194, 23448, 23474, 25568, 25600, 25617, 25800, 25831, 25879, 25890, 25978, 26015, 26016, 26018, 26051, 26140, 26195, 26232, 26286, 26295, 26382, 26520, 26643, 26757, 26768, 26799, 26861, 26922, 26986, 27174, 27289, 27335, 27384, 27386, 27426, 27470, 28355, 29763, 29769, 29829, 29855, 30004, 30006, 30037, 30104, 30155, 30265, 30307, 30550, 30631, 30656, 30699, 31781, 31813, 32021, 32121, 32151, 32187, 32202, 32203, 32282, 32346, 32358, 32485, 32497, 32552, 32581, 32591, 32596, 32669, 32679, 32772, 32891, 32985, 33020, 33023, 33042, 33051, 33158, 33245, 33394, 33417, 33448, 33484, 33617, 33625, 33628, 33677, 33679, 33732, 35846, 35948, 36002, 36051, 36357, 36461, 36465, 36843, 36886, 36900, 36957, 36979, 37155, 37161, 37280, 37320, 37382, 37434, 37448, 37466, 37475, 37476, 37533, 38055, 39960, 39991, 40186, 40255, 40279, 40329, 40399, 40430, 40544, 40600, 40745, 40751, 40779, 40875, 40909, 40920, 46080, 46086, 46123, 46161, 46228, 46233, 46318, 46414, 46472, 46505, 46645, 46673, 46766, 46783, 46815, 46876, 46916, 46967, 47044, 47055, 47069, 53328, 53358, 53419, 53552, 53572, 53614, 53622, 53627, 53651, 53657, 53715, 53751, 53771, 53929, 53947, 54041, 54193, 54209, 54231, 54262, 54278, 54309, 54517, 54590, 54681, 54726, 54730, 54752, 54753, 54776, 54785, 54787, 55285, 55563, 55827, 56096, 59417, 59645, 61634, 62828, 62865, 63001, 63248, 63305, 63375, 63387, 63477, 64011, 64042, 64140, 64339, 64355, 64496, 64506, 65540, 65544, 65550, 65552, 65595, 65724, 65725, 133425, 135074, 138014, 138169, 138241, 138618, 139204, 139629, 227171, 230105, 260115, 261050, 263100, 263463, 263986, 264085, 264187, 264252, 264493, 265039, 266842, 267874, 267968, 268322, 268338, 268652, 327074, 327734, 327869, 327967, 328115, 328279, 328369, 328402, 393266, 393320, 393377, 393385, 393446, 393489, 393491, 393572, 393579, 393583, 393588, 393612, 393636, 393720, 393866, 394011, 394039, 394156, 394268, 394376, 394402, 394467, 394519, 394550, 394715, 394721, 394879, 394936, 395350, 395438, 395596, 396330, 396448

List of Unregistered Origin ASNs

Far too many to list. See <http://thyme.apnic.net/current/data-badAS>:

Bad AS	Designation	Net Originated	Transit AS	Transit AS Name
62828	UNALLOCATED	8.21.130.0/24	3356	LEVEL3, US
393266	UNALLOCATED	8.23.52.0/24	174	COGENT-174, US
18604	UNALLOCATED	8.25.204.0/24	3356	LEVEL3, US
32985	UNALLOCATED	8.28.31.0/24	3356	LEVEL3, US
394936	UNALLOCATED	8.33.224.0/24	174	COGENT-174, US
393579	UNALLOCATED	8.38.98.0/24	3356	LEVEL3, US
23061	UNALLOCATED	8.39.119.0/24	3356	LEVEL3, US
395438	UNALLOCATED	8.42.206.0/24	3356	LEVEL3, US
46766	UNALLOCATED	8.44.208.0/24	3356	LEVEL3, US
40544	UNALLOCATED	12.0.33.0/24	6461	ZAYO-6461, US
393489	UNALLOCATED	12.7.109.0/24	7018	ATT-INTERNET4, US
46505	UNALLOCATED	12.7.131.0/24	7018	ATT-INTERNET4, US
15132	UNALLOCATED	12.9.150.0/24	1239	SPRINTLINK, US
22280	UNALLOCATED	12.10.217.0/24	701	UUNET, US
20118	UNALLOCATED	12.32.206.0/24	7029	WINDSTREAM, US
21861	UNALLOCATED	12.37.59.0/24	7018	ATT-INTERNET4, US
14478	UNALLOCATED	12.41.98.0/24	7018	ATT-INTERNET4, US
13317	UNALLOCATED	12.44.10.0/24	7018	ATT-INTERNET4, US
63305	UNALLOCATED	12.49.58.0/24	7018	ATT-INTERNET4, US
31781	UNALLOCATED	12.71.107.0/24	7018	ATT-INTERNET4, US
21861	UNALLOCATED	12.106.212.0/24	7018	ATT-INTERNET4, US
26295	UNALLOCATED	12.110.210.0/23	7018	ATT-INTERNET4, US
21986	UNALLOCATED	12.110.215.0/24	7018	ATT-INTERNET4, US
54753	UNALLOCATED	12.111.79.0/24	209	CENTURYLINK-US-LEGACY-QWEST,
11969	UNALLOCATED	12.130.205.0/24	16966	SBCIDC-LSAN03, US
22538	UNALLOCATED	12.131.3.0/24	7018	ATT-INTERNET4, US

List of Unregistered Origin ASNs

Far too many to list. See <http://thyme.apnic.net/current/data-badAS>:

Bad AS	Designation	Net Originated	Transit AS	Transit AS Name
21666	UNALLOCATED	38.65.207.0/24	6461	ZAYO-6461, US
16581	UNALLOCATED	38.68.223.0/24	174	COGENT-174, US
394550	UNALLOCATED	38.72.125.0/24	174	COGENT-174, US
394715	UNALLOCATED	38.75.134.0/23	6461	ZAYO-6461, US
27335	UNALLOCATED	38.94.165.0/24	174	COGENT-174, US
40255	UNALLOCATED	38.96.168.0/24	174	COGENT-174, US
19359	UNALLOCATED	38.97.101.0/24	7015	COMCAST-7015, US
33023	UNALLOCATED	38.98.67.0/24	174	COGENT-174, US
33732	UNALLOCATED	38.98.87.0/24	46887	LIGHTOWER, US
32772	UNALLOCATED	38.98.108.0/24	174	COGENT-174, US
11636	UNALLOCATED	38.99.129.0/24	603	BACOM2-AS, CA
21714	UNALLOCATED	38.100.165.0/24	174	COGENT-174, US
22830	UNALLOCATED	38.105.72.0/22	174	COGENT-174, US
21986	UNALLOCATED	38.105.89.0/24	174	COGENT-174, US
23194	UNALLOCATED	38.105.151.0/24	174	COGENT-174, US
46414	UNALLOCATED	38.107.138.0/24	174	COGENT-174, US
46967	UNALLOCATED	38.109.114.0/24	174	COGENT-174, US
230105	UNALLOCATED	38.110.79.0/24	23015	CMC180-TOR-AS, CA
21986	UNALLOCATED	38.110.139.0/24	7018	ATT-INTERNET4, US
21986	UNALLOCATED	38.112.114.0/24	174	COGENT-174, US
22830	UNALLOCATED	38.118.3.0/24	174	COGENT-174, US
21665	UNALLOCATED	38.118.211.0/24	174	COGENT-174, US
25831	UNALLOCATED	38.121.139.0/24	174	COGENT-174, US
53627	UNALLOCATED	38.121.178.0/24	13789	INTERNAP-BLK3, US
21714	UNALLOCATED	38.121.234.0/24	174	COGENT-174, US
394715	UNALLOCATED	38.124.29.0/24	174	COGENT-174, US

List of Unassigned addresses

Far too many to list. See <http://thyme.apnic.net/current/data-add-IANA:>

Unassigned Network	ASN Information	AS Name
23.133.192.0/24	Origin: 16734	UNASSIGNED
	Transit: 266201	RNV CORP EIRELI, BR
23.141.0.0/24	Origin: 395350	UNASSIGNED
	Transit: 11426	TWC-11426-CAROLINAS, US
23.142.80.0/24	Origin: 397881	STINGERS, US
	Transit: 398481	REDMERCURY, US
27.100.7.0/24	Origin: 56096	UNASSIGNED
	Transit: 45455	TH-2S1N-AP Two S One N Co Ltd, Internet
27.126.156.0/22	Origin: 55827	UNASSIGNED
	Transit: 9930	TTNET-MY TIME dotCom Berhad No. 14, Jala
27.126.156.0/23	Origin: 55827	UNASSIGNED
	Transit: 9930	TTNET-MY TIME dotCom Berhad No. 14, Jala
27.126.158.0/23	Origin: 55827	UNASSIGNED
	Transit: 9930	TTNET-MY TIME dotCom Berhad No. 14, Jala
41.72.0.0/23	Origin: 37155	UNASSIGNED
	Transit: 17400	EBONET, AO
<snip>		
41.76.199.0/24	Origin: 37280	UNASSIGNED
	Transit: 327952	AS-NATCOM, NG
41.77.64.0/21	Origin: 37320	UNASSIGNED
	Transit: 29614	GHANATEL-AS, GH
41.77.68.0/22	Origin: 37320	UNASSIGNED
	Transit: 37350	IS-GHANA, GH
41.77.208.0/22	Origin: 37475	UNASSIGNED
	Transit: 15964	CAMNET-AS, CM
41.77.240.0/21	Origin: 22769	DDOSING-BGP-NETWORK, US
	Transit: 57724	DDOS-GUARD, RU

List of Unassigned addresses

Far too many to list. See <http://thyme.apnic.net/current/data-add-IANA>:

Unassigned Network	ASN Information	AS Name
41.78.60.0/22	Origin: 6762	SEABONE-NET TELECOM ITALIA SPARKLE S.p.A
	Transit: 2516	KDDI KDDI CORPORATION, JP
41.78.164.0/24	Origin: 328013	ISPAfrika, ZA
	Transit: 37179	AFRICAINX, ZA
41.78.165.0/24	Origin: 328013	ISPAfrika, ZA
	Transit: 37179	AFRICAINX, ZA
41.78.166.0/24	Origin: 328013	ISPAfrika, ZA
	Transit: 37179	AFRICAINX, ZA
41.78.167.0/24	Origin: 328013	ISPAfrika, ZA
	Transit: 37179	AFRICAINX, ZA
41.78.204.0/22	Origin: 37475	UNASSIGNED
	Transit: 15964	CAMNET-AS, CM
41.79.128.0/22	Origin: 37475	UNASSIGNED
	Transit: 15964	CAMNET-AS, CM
41.79.164.0/22	Origin: 328013	ISPAfrika, ZA
	Transit: 37179	AFRICAINX, ZA
<snip>		
196.11.150.0/23	Origin: 36979	UNASSIGNED
	Transit: 37282	MAINONE, NG
196.13.201.0/24	Origin: 327967	UNASSIGNED
	Transit: 36994	Vodacom-VB, ZA
196.13.203.0/24	Origin: 37476	UNASSIGNED
	Transit: 20294	MTN-, UG
196.13.223.0/24	Origin: 327734	UNASSIGNED
	Transit: 37336	UCOM-WIC, BI
196.29.99.0/24	Origin: 33780	UNASSIGNED
	Transit: 327814	Ecoband, GH

List of Unassigned addresses

Far too many to list. See <http://thyme.apnic.net/current/data-add-IANA>:

Unassigned Network	ASN Information	AS Name
103.12.76.0/22	Origin: 55933 Transit: 6939	CLOUDIE-AS-AP Cloudie Limited, HK HURRICANE, US
103.24.227.0/24	Origin: 38186 Transit: 9381	FTG-AS-AP Forewin Telecom Group Limited, HKBNES-AS-AP HKBN Enterprise Solutions H
103.48.20.0/22	Origin: 136800 Transit: 9304	XIAOZHUYUN1-AS-AP ICIDC NETWORK, US HUTCHISON-AS-AP HGC Global Communication
103.48.21.0/24	Origin: 136800 Transit: 9304	XIAOZHUYUN1-AS-AP ICIDC NETWORK, US HUTCHISON-AS-AP HGC Global Communication
103.51.102.0/24	Origin: 15084 Transit: 4755	CONVERGYS, US TATACOMM-AS TATA Communications formerly
103.51.128.0/24	Origin: 15084 Transit: 4755	CONVERGYS, US TATACOMM-AS TATA Communications formerly
103.62.40.0/24	Origin: 58640 Transit: 9498	NEXTRA-IN NEXTRA TELESERVICES PVT. LTD., BBIL-AP BHARTI Airtel Ltd., IN
103.62.41.0/24	Origin: 58640 Transit: 9498	NEXTRA-IN NEXTRA TELESERVICES PVT. LTD., BBIL-AP BHARTI Airtel Ltd., IN
<snip>		
203.160.138.0/24	Origin: 4755 Transit: 6453	TATACOMM-AS TATA Communications formerly AS6453, US
203.160.139.0/24	Origin: 4755 Transit: 6453	TATACOMM-AS TATA Communications formerly AS6453, US
203.170.90.0/23	Origin: 7619 Transit: 24043	TCOSI-AS-AP Telecommunications Commissio DATAPIPE-HK-AP DataPipe Hong Kong, HK
203.170.90.0/24	Origin: 7619 Transit: 24043	TCOSI-AS-AP Telecommunications Commissio DATAPIPE-HK-AP DataPipe Hong Kong, HK
203.170.91.0/24	Origin: 7619 Transit: 24043	TCOSI-AS-AP Telecommunications Commissio DATAPIPE-HK-AP DataPipe Hong Kong, HK

Number of prefixes announced by prefix length

/1:0	/2:0	/3:0	/4:0	/5:0	/6:0	/7:0	/8:10
/9:11	/10:37	/11:98	/12:287	/13:579	/14:1159	/15:1922	/16:13376
/17:8101	/18:13882	/19:25773	/20:40319	/21:47525	/22:98195	/23:80492	/24:456464
/25:1310	/26:0	/27:0	/28:0	/29:0	/30:0	/31:0	/32:0

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4th January 2021 ↓

/1:0	/2:0	/3:0	/4:0	/5:0	/6:0	/7:0	/8:8
/9:13	/10:40	/11:101	/12:292	/13:579	/14:1175	/15:1930	/16:13470
/17:8263	/18:13707	/19:25606	/20:41498	/21:50584	/22:103653	/23:88105	/24:485345
/25:1309	/26:0	/27:0	/28:0	/29:0	/30:0	/31:0	/32:0



What about IPv6 ?

Table Size	99718
Number of /32s	15337
Number of /48s	49249
Number of prefixes >/48	0 ← ISP is Filtering 😊
Number of prefixes >/32 and </48	30811
Number of prefixes >/16 and </32	4321

Number of IPv6 prefixes announced by prefix length

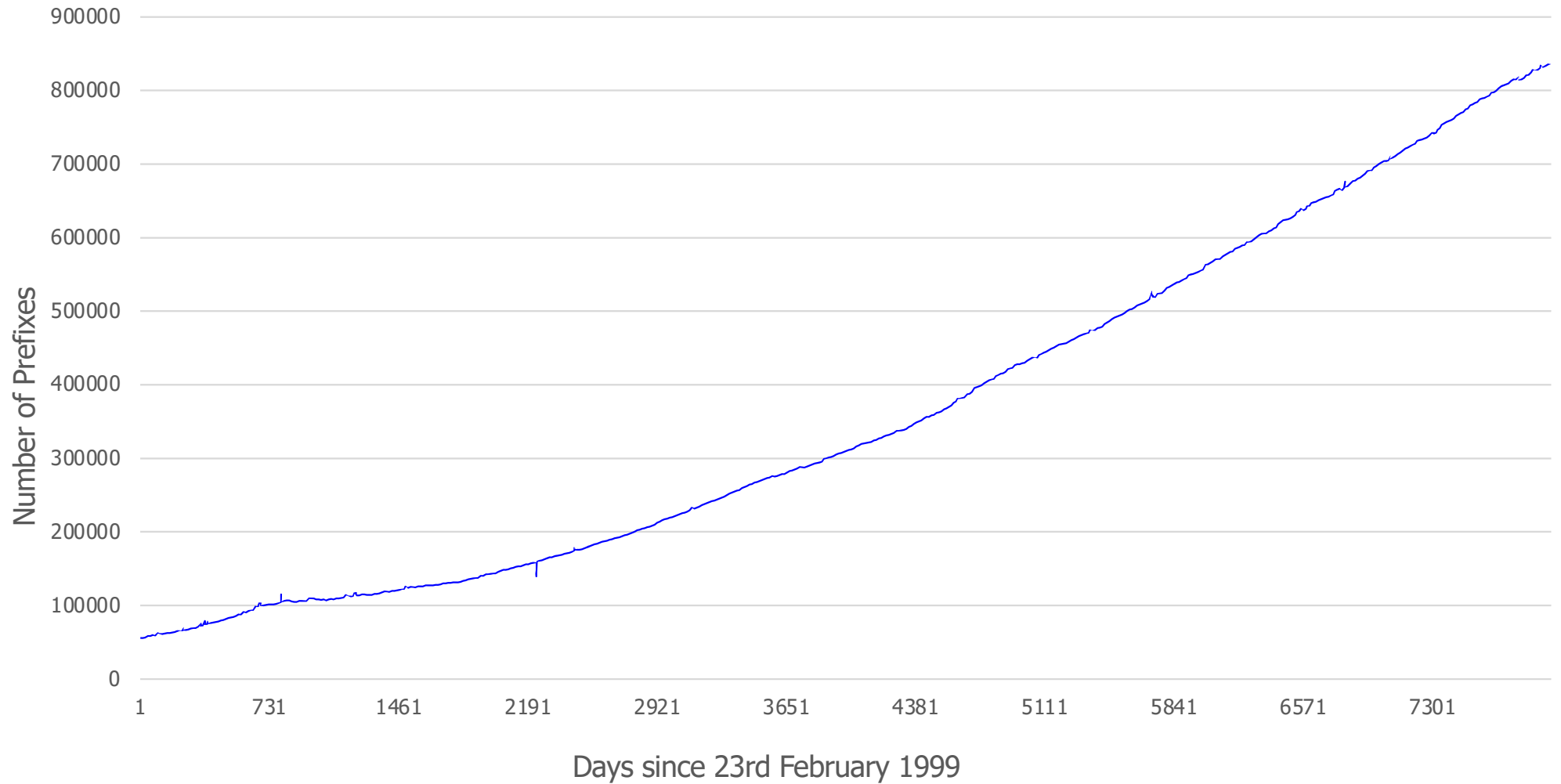
/16:0	/17:0	/18:0	/19:1	/20:13	/21:3	/22:7	/23:7
/24:28	/25:8	/26:14	/27:20	/28:112	/29:3446	/30:478	/31:184
/32:15337	/33:1801	/34:1458	/35:657	/36:3975	/37:652	/38:1112	/39:378
/40:5453	/41:646	/42:2357	/43:521	/44:7173	/45:686	/46:2329	/47:1613
/48:49249	/49 → /128: FILTERED by ISP						

4th January 2021 ↑

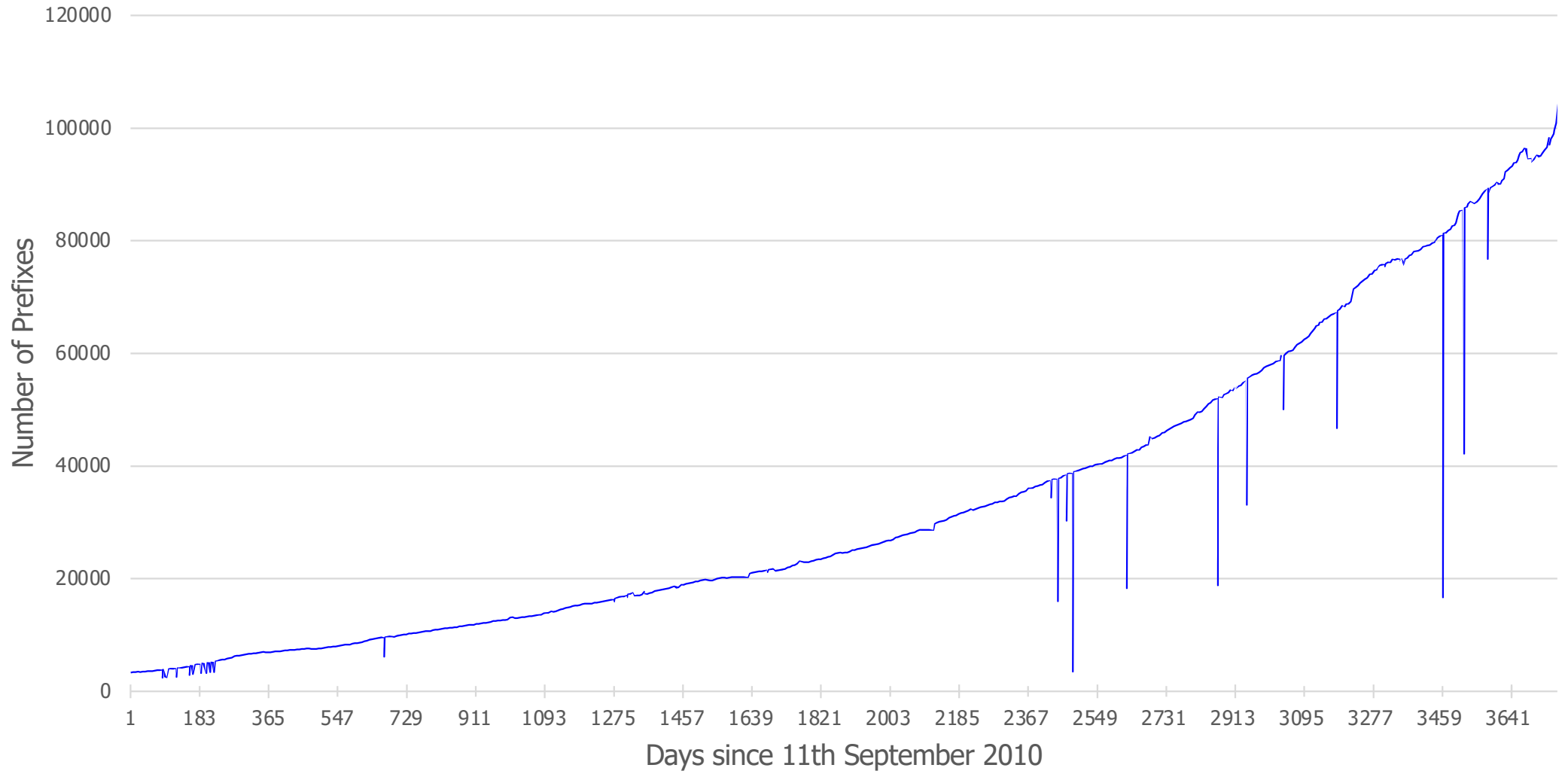
7th January 2011 ↓

/16:1	/17:0	/18:0	/19:2	/20:5	/21:4	/22:4	/23:1
/24:2	/25:1	/26:5	/27:5	/28:11	/29:4	/30:8	/31:5
/32:2409	/33:47	/34:27	/35:54	/36:94	/37:2	/38:8	/39:2
/40:108	/41:6	/42:27	/43:3	/44:29	/45:7	/46:13	/47:21
/48:1122	/49 → /128: FILTERED by ISP						

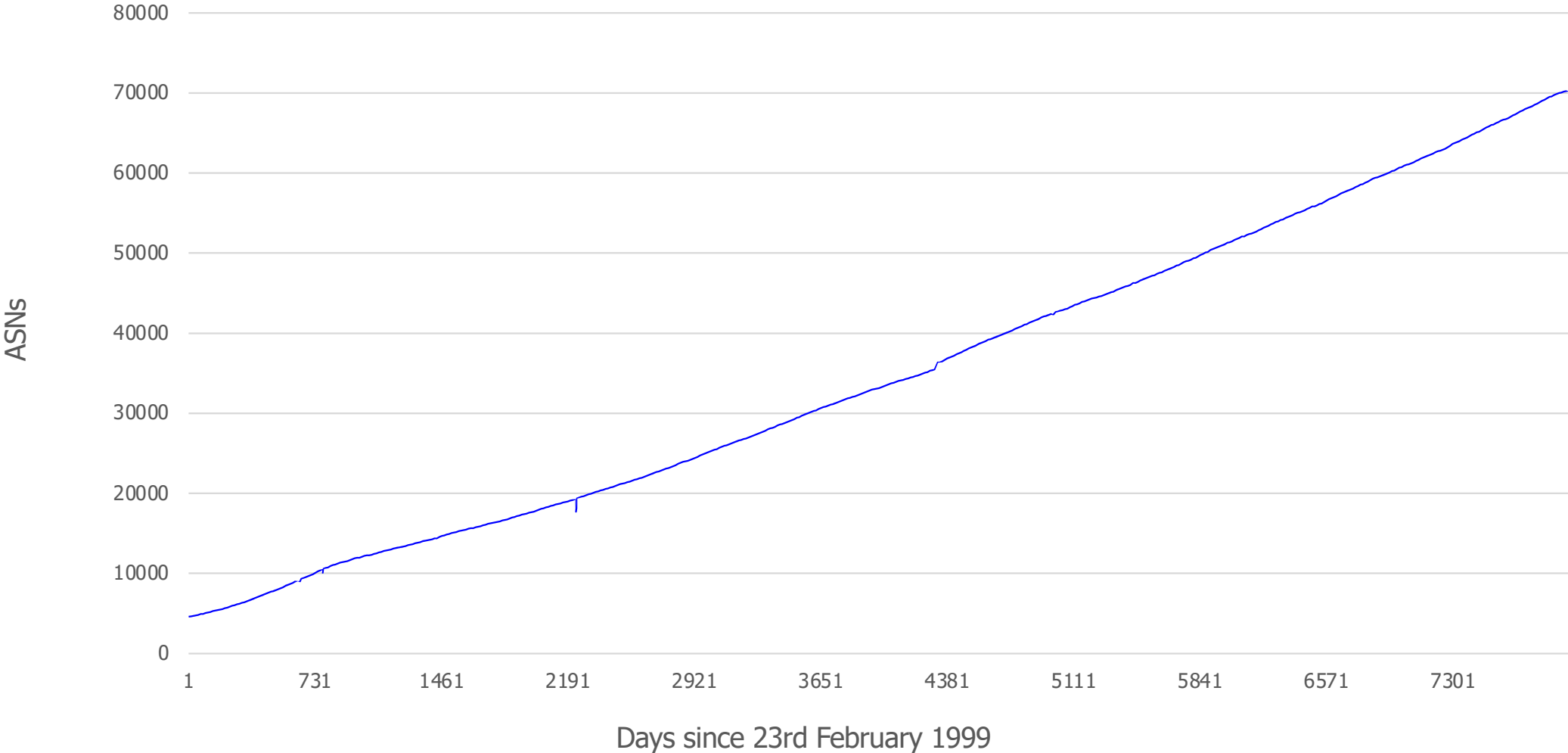
Global IPv4 Routing Table



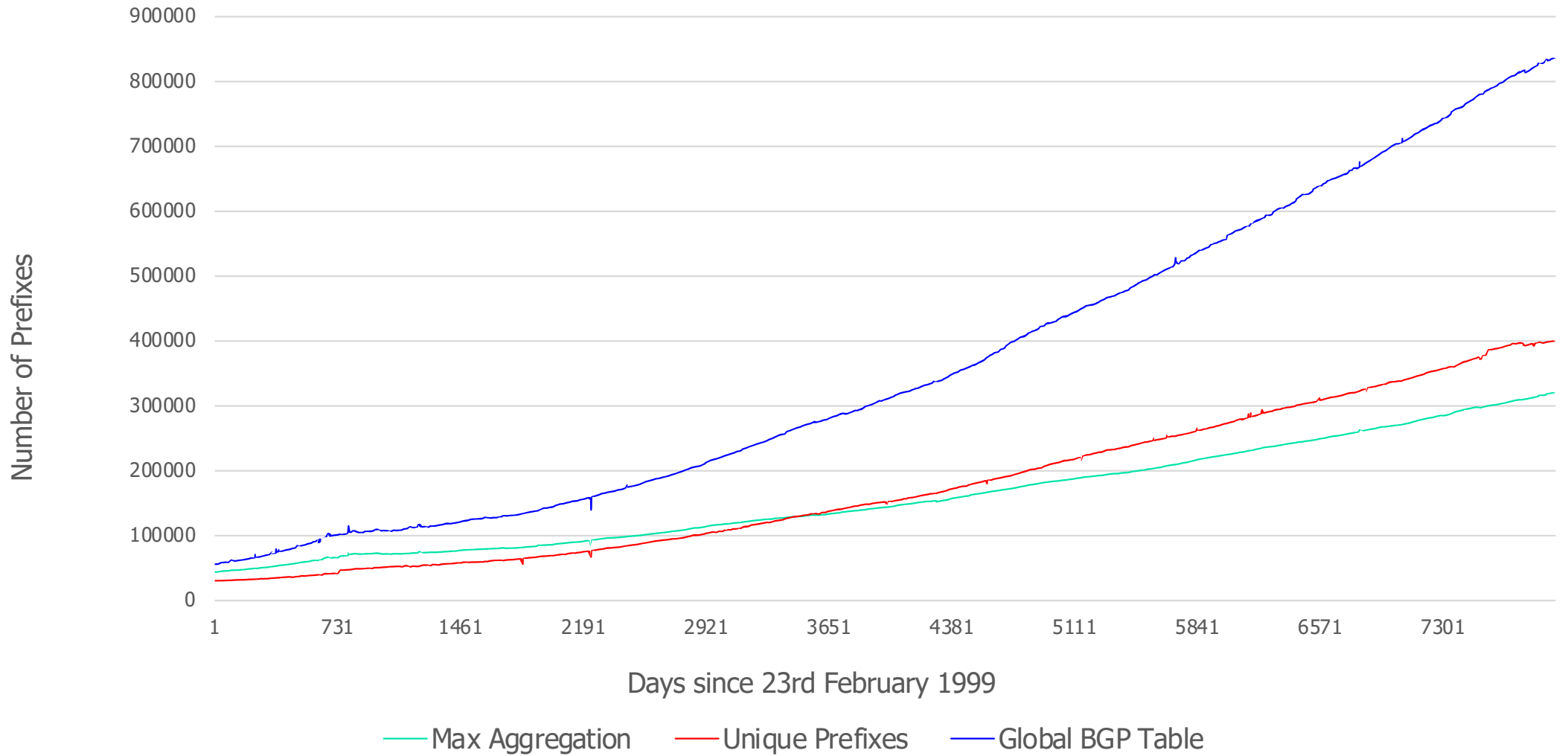
Global IPv6 Routing Table



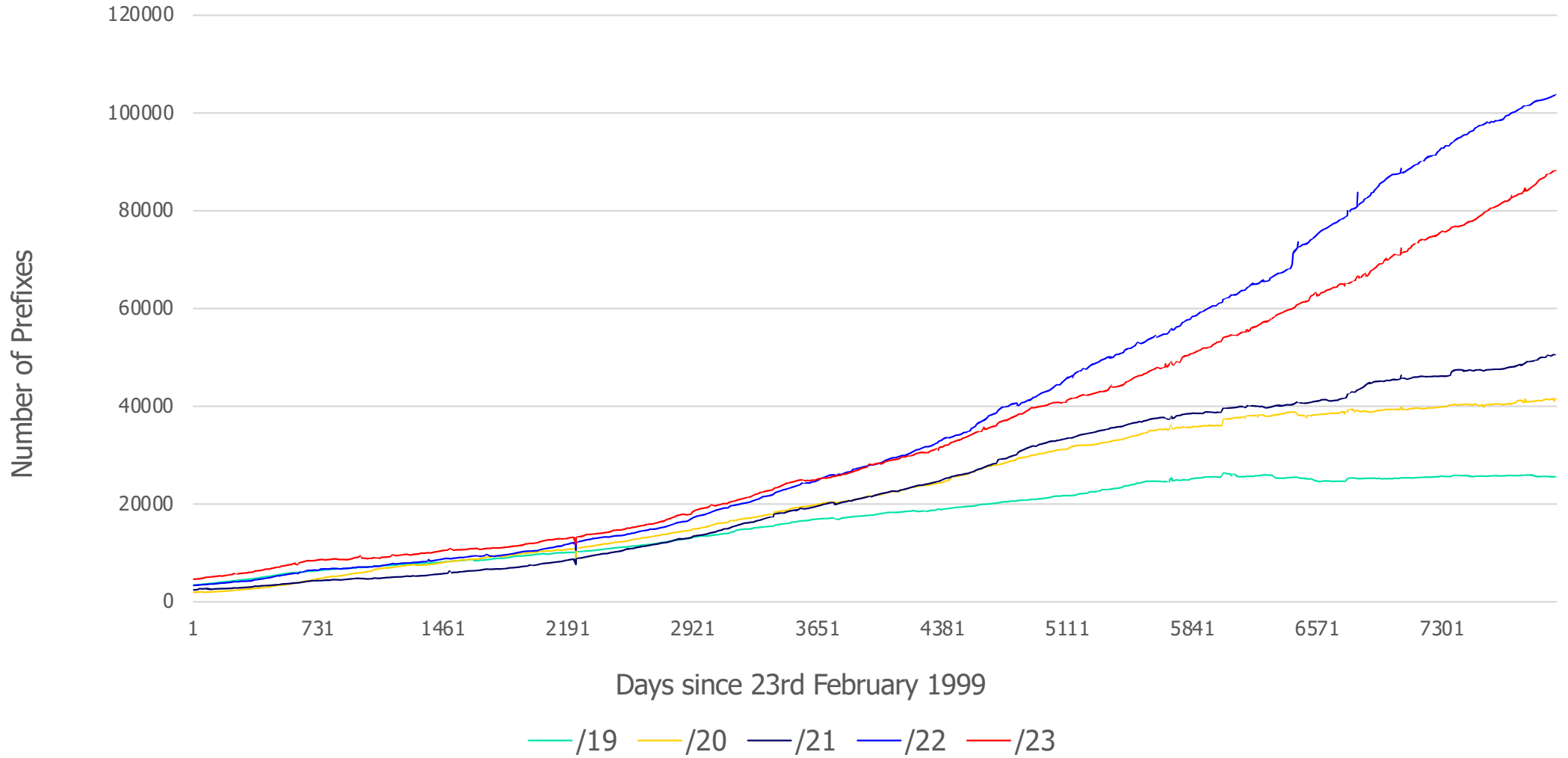
AS Growth



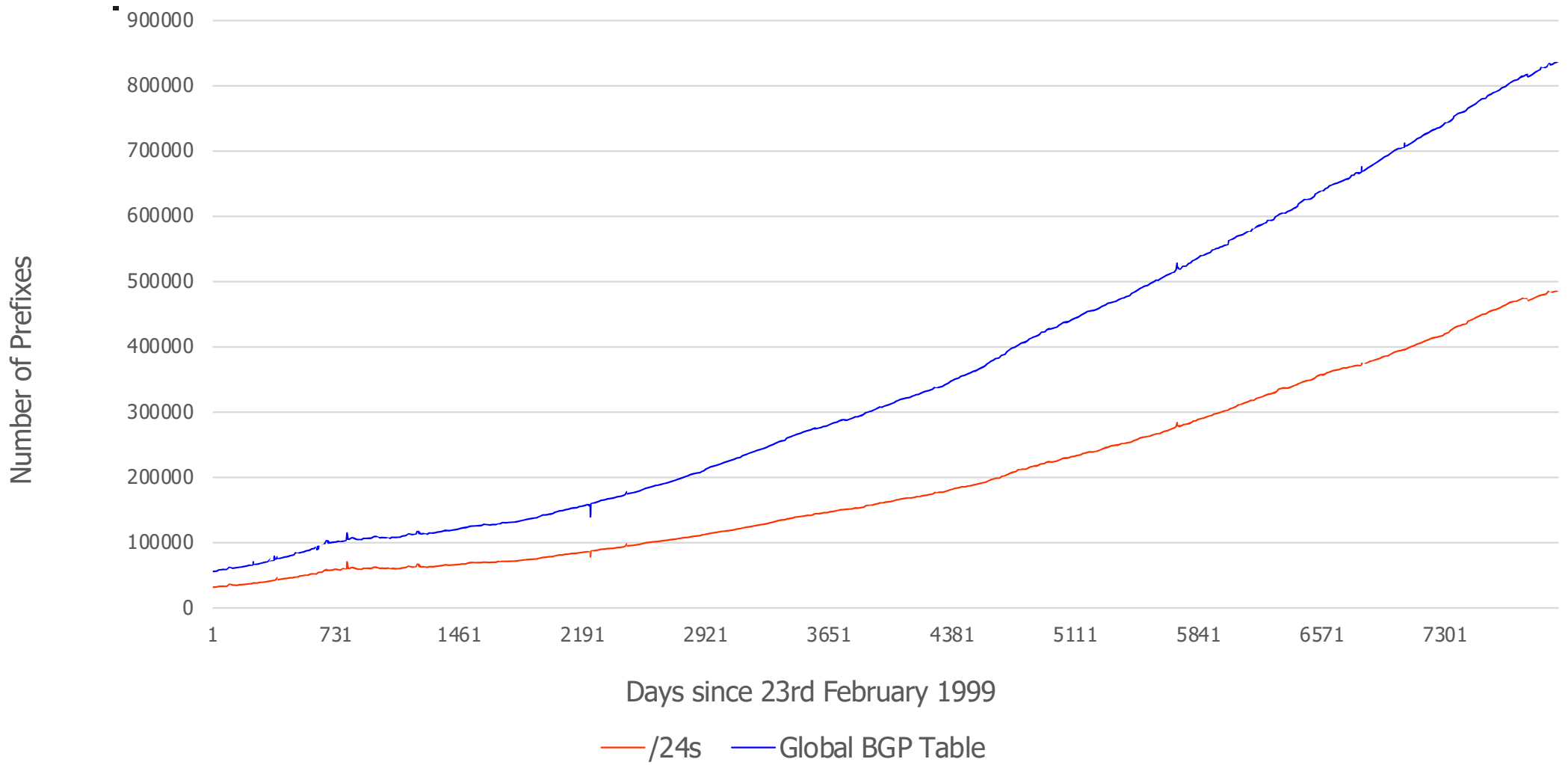
Max Aggregation vs Unique Prefixes



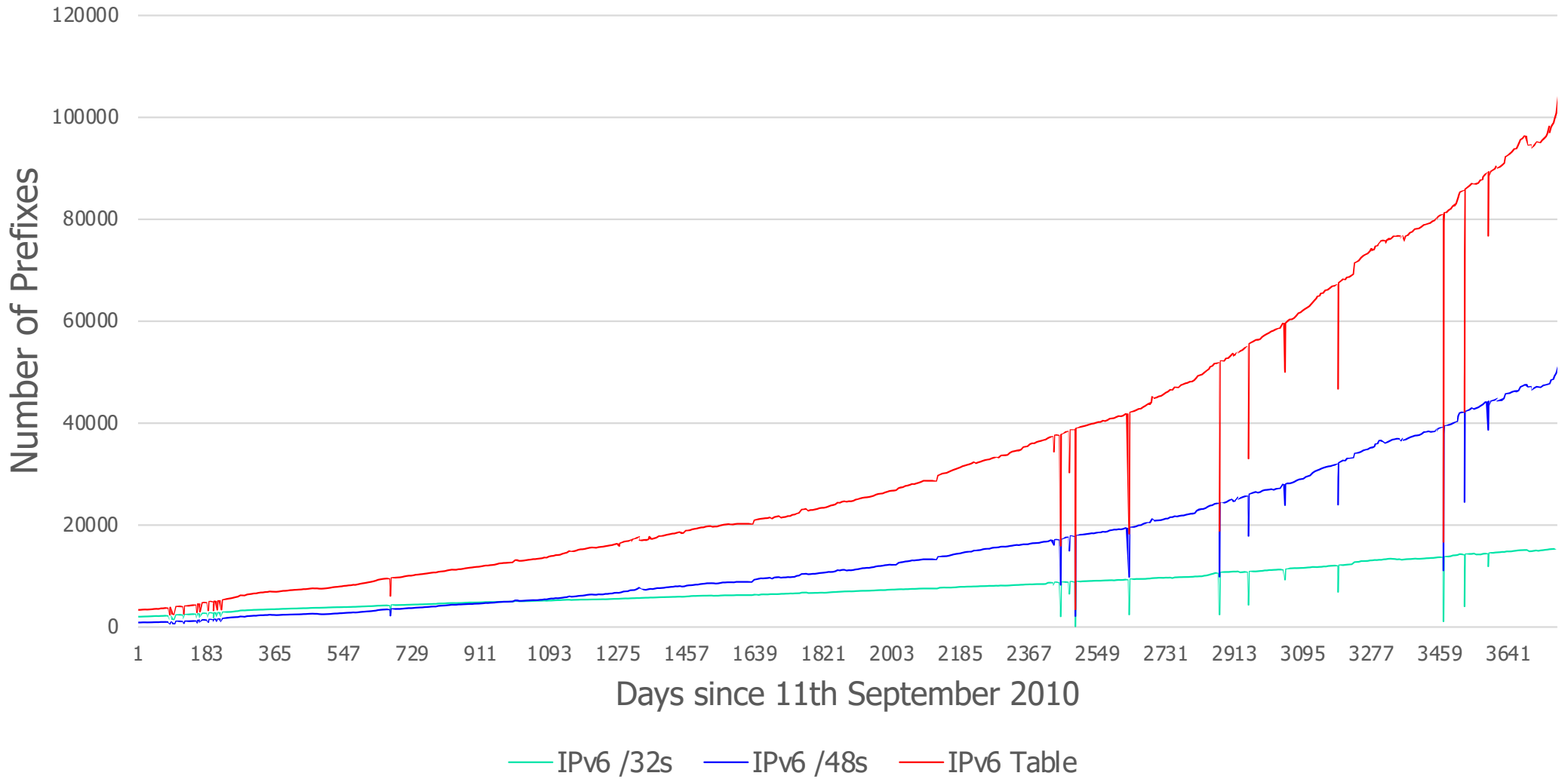
Prefix sizes announced



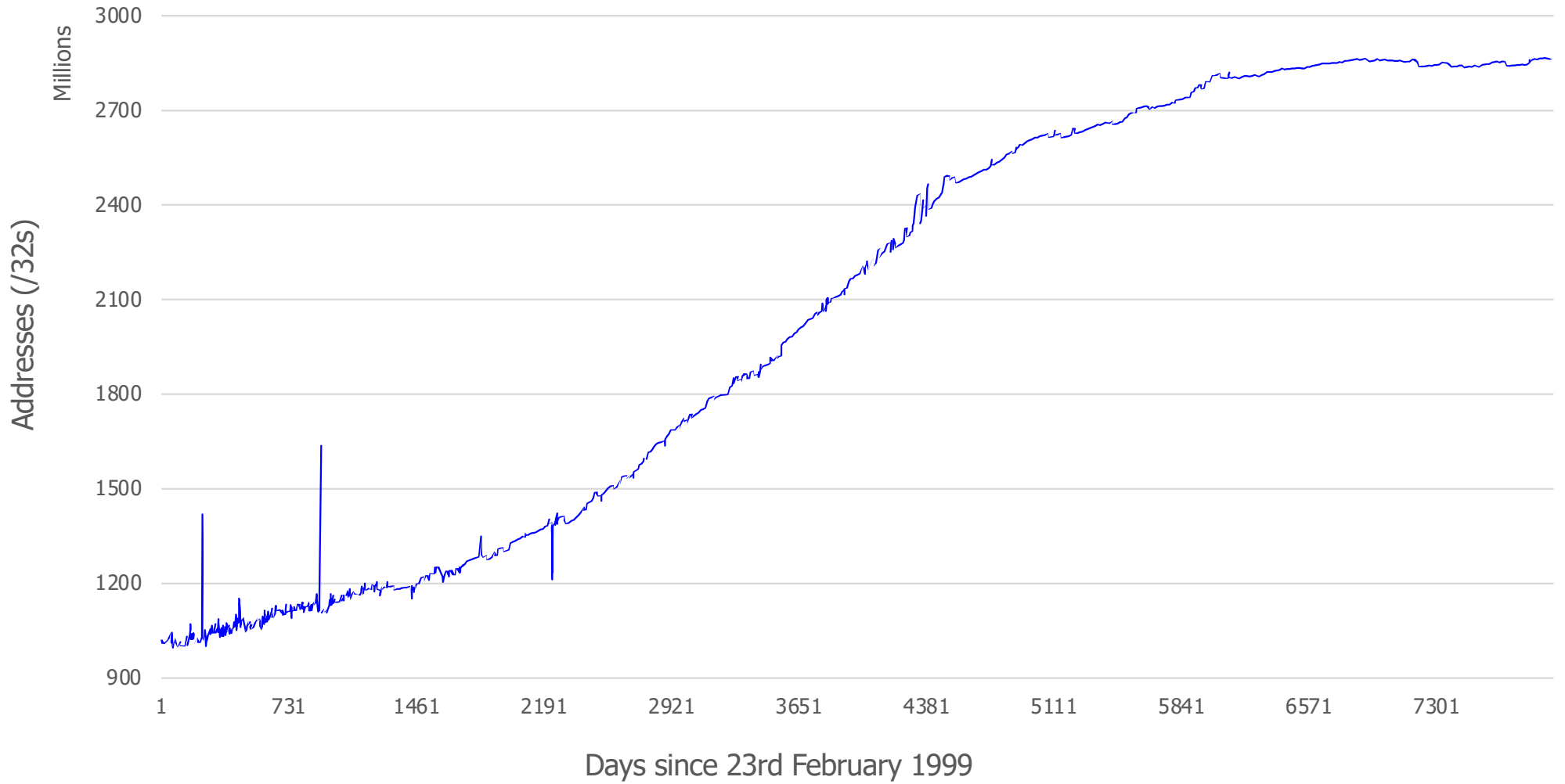
/24s announced



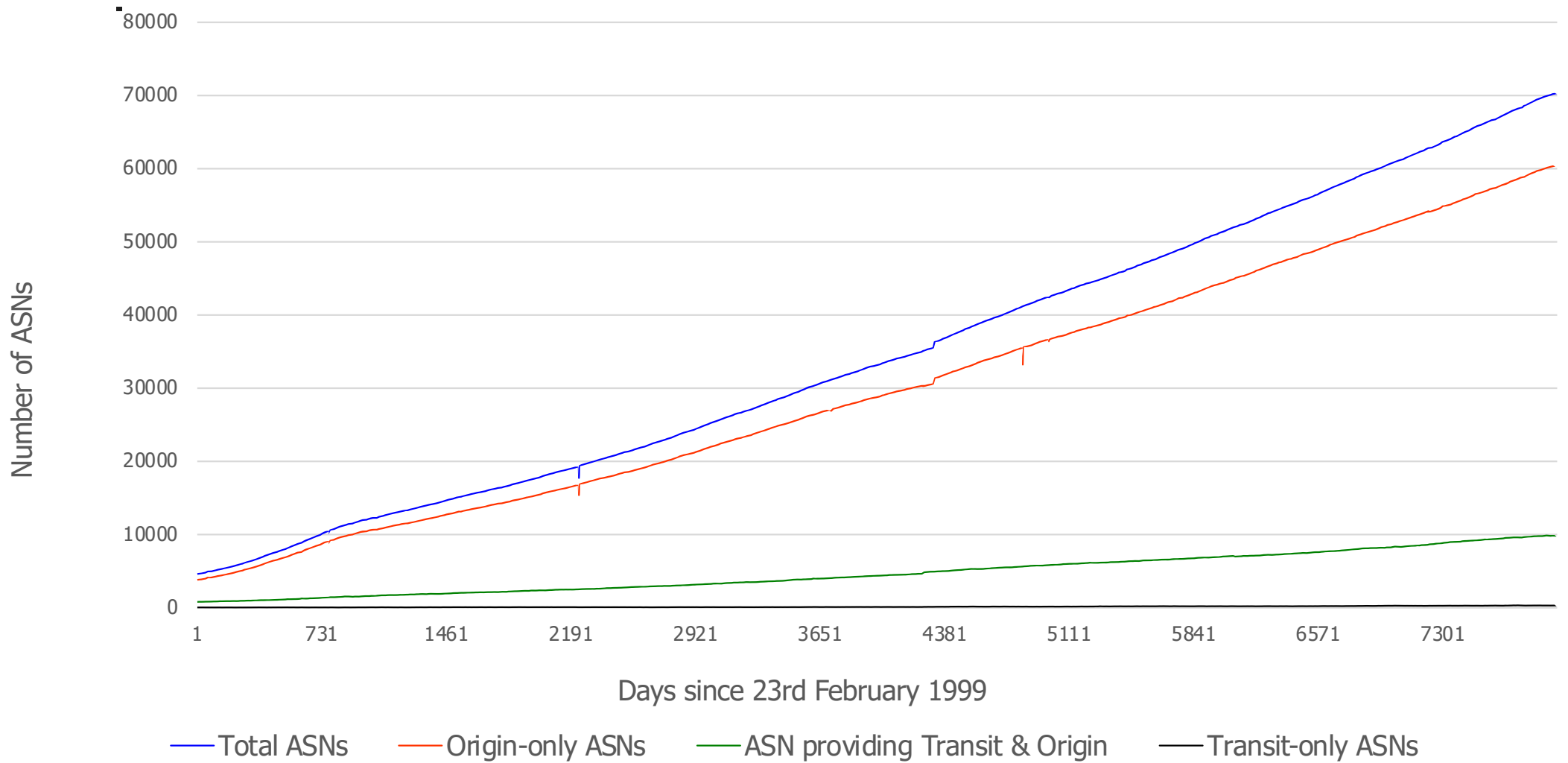
IPv6 /32s vs /48s



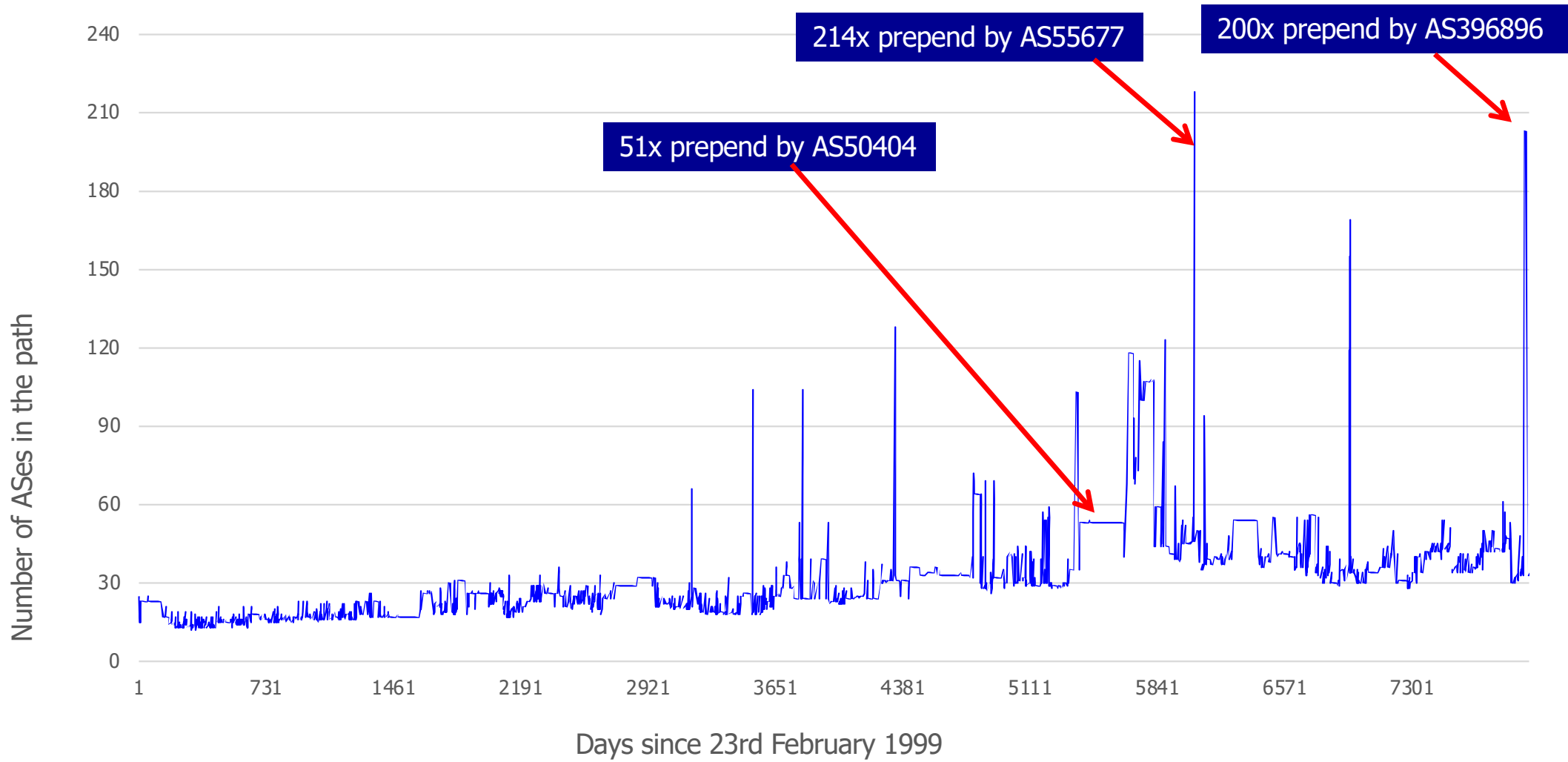
IPv4 Address Space announced



AS Announcements



Maximum AS Path Length





Looking at Deaggregation

- CIDR Report
 - www.cidr-report.org
 - Encourages aggregation following CIDRisation of Internet
 - Today: extensive suite of reports and tools covering state of BGP table
- Routing Report
 - BGP table status on per RIR basis
 - Original CIDR Report and a whole lot more



Deaggregation Factor

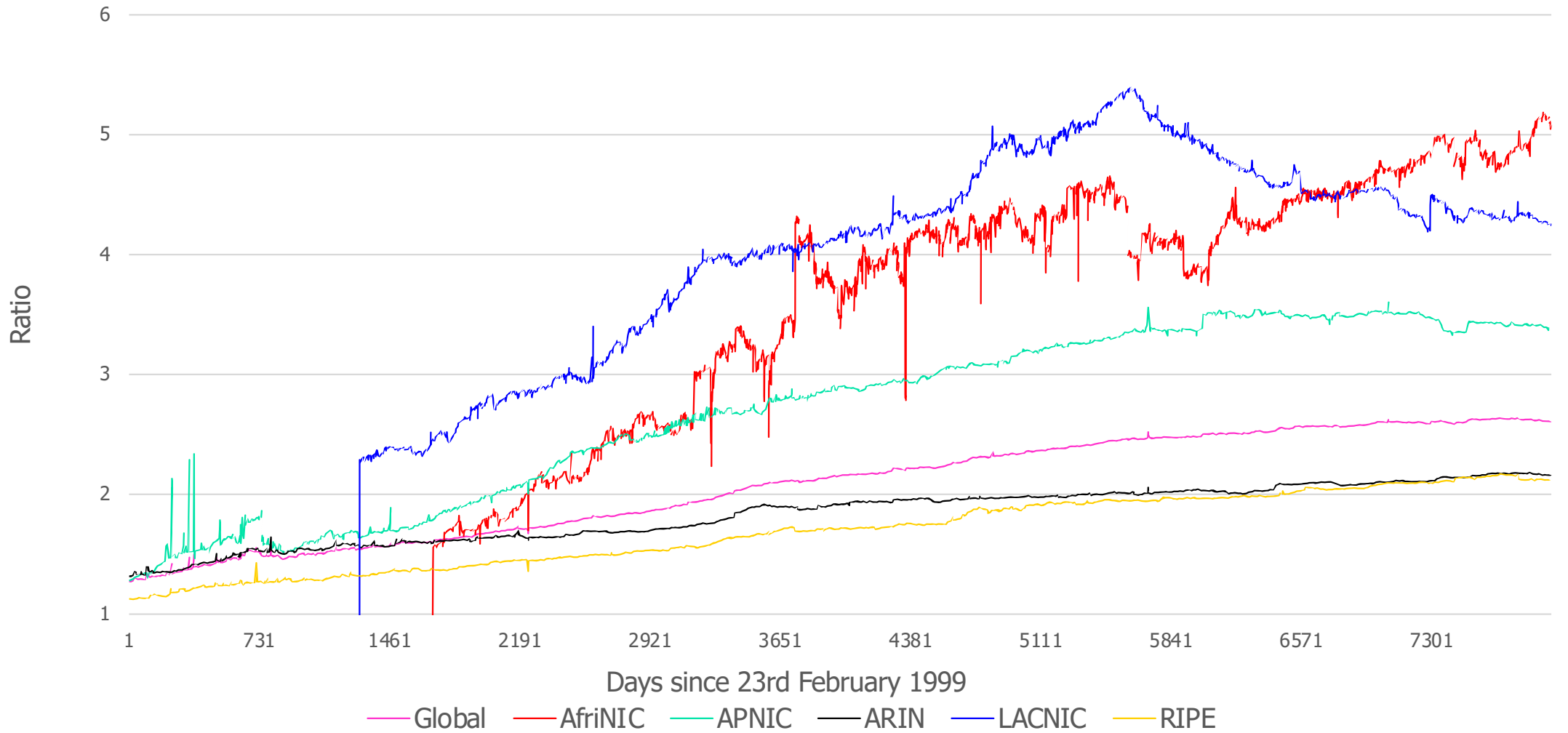
- Routing Report
 - One summary takes BGP table and aggregates prefixes by origin AS
 - Called “Max Aggregation” in report
 - Global and per RIR basis
 - <http://thyme.apnic.net/current/>
- Calculates **Deaggregation** Factor:
 - Measure of Routing Table size/Aggregated Size
 - Global value has been increasing slowly and steadily since “records began”



January 2020

- **Total Prefixes**
- Global BGP Table
 - 836k prefixes
- North America
 - 241k prefixes
- Europe & Middle East
 - 238k prefixes
- Asia & Pacific
 - 219k prefixes
- Latin America & Caribbean
 - 112k prefixes
- Africa
 - 25k prefixes
- **Deaggregation Factor**
- Global Average
 - 2.61
- North America
 - 2.16
- Europe & Middle East
 - 2.12
- Asia & Pacific
 - 3.39
- Latin America & Caribbean
 - 4.26
- Africa
 - 5.12

Deaggregation: RIR Regions vs Global



Asia Pacific Aggregation Savings Summary

ASN	No of Nets	Savings	Description
7545	5683	5023	TPG-INTERNET-AP TPG Telecom Limited, AU
4538	4745	4671	ERX-CERNET-BKB China Education and Research Net
7552	3562	3541	VIETEL-AS-AP Viettel Group, VN
45899	2863	2808	VNPT-AS-VN VNPT Corp, VN
9808	2779	2722	CMNET-GD Guangdong Mobile Communication Co.Ltd.
7713	3234	2715	TELKOMNET-AS-AP PT Telekomunikasi Indonesia, ID
9498	2296	2063	BBIL-AP BHARTI Airtel Ltd., IN
9394	2042	2026	CTTNET China TieTong Telecommunications Corpora
45090	2067	2004	CNNIC-TENCENT-NET-AP Shenzhen Tencent Computer
4755	2130	1941	TATACOMM-AS TATA Communications formerly VSNL i
4766	2477	1905	KIXS-AS-KR Korea Telecom, KR
23969	1905	1889	TOT-NET TOT Public Company Limited, TH
9829	1888	1842	BSNL-NIB National Internet Backbone, IN
18403	1583	1544	FPT-AS-AP The Corporation for Financing & Promo
56041	1347	1270	CMNET-ZHEJIANG-AP China Mobile communications c
45609	1568	1238	BHARTI-MOBILITY-AS-AP Bharti Airtel Ltd. AS for
24560	1475	1171	AIRTELBROADBAND-AS-AP Bharti Airtel Ltd., Telem
9583	1696	1168	SIFY-AS-IN Sify Limited, IN
56047	1133	1097	CMNET-HUNAN-AP China Mobile communications corp
17488	1196	1062	HATHWAY-NET-AP Hathway IP Over Cable Internet,

<http://thyme.apnic.net/current/data-CIDRnet-APNIC>

Nepal Aggregation Savings Summary

ASN	No of Nets	Savings	Description
23752	97	91	NPTELECOM-NP-AS Nepal Telecommunications Corpor
17501	97	88	WLINK-NEPAL-AS-AP WorldLink Communications Pvt
4007	80	68	SUBISU-CABLENET-AS-AP Subisu Cablenet (Pvt) Ltd
24550	56	49	WEBSURFERNP-AS-NP Websurfer Nepal Internet Serv
55915	33	25	CLASSIC-NP Classic Tech Pvt. Ltd., NP
45650	40	24	VIANET-NP Vianet Communications Pvt. Ltd., NP
58504	13	9	TECHMINDS-NP TECHMINDS NETWORKS PVT. LTD., NP
55427	12	9	BROADLINK-AS-AP Broadlink Nepal, NP
4613	35	9	MOS-NP Mercantile Office Systems, NP
38565	11	8	NCELL-AS-NP Ncell Pvt. Ltd., NP
45424	9	7	HONS-AS-NP Network Pool Allocated for HONS Netw
136908	9	7	SBPL-AS-AP Sky Broadband Pvt. Ltd, NP
135327	9	7	CWC-AS-AP Cherry World Communication Pvt Ltd, N
136763	7	6	UCPL-AS-AP Unified Communication Private Limite
136530	8	6	ULTRANET-AS-AP Ultranet Communications, NP
45845	15	5	NEPAL-IIG-AS NEPAL INTERNATIONAL INTERNET GATEW
18395	7	5	INFOCOMNP-AS-AP Infocom Pvt. Ltd, NP
138495	6	5	ALISHA-AS-AP Alisha Communication Link Pvt.Ltd,
134995	6	5	IZONE-AS-AP I. ZONE PVT. LTD, NP
45353	5	4	NITC-AS-AP NITC: IT Agency of Government of Nep



IPv4 Observations

- Routing table continues to grow
 - Linear growth for last 8 years
 - Even though total address space announced has levelled off over the last 3 years
- /24 announcements continue to grow
 - Clearly many operators are deaggregating down to the smallest prefix size considered routable
 - Do operators still filter prefix sizes smaller than /24?
 - (A few /25s through /32s are visible)
- Overall global deaggregation ratio growth has slowed
 - Significant improvements in Latin America



IPv6 Observations

- Routing table growth continued slowing through 2020
 - How to interpret this?
- /48 announcements continue to grow rapidly
 - Operators seem to believe that IPv6 /48 needs to be treated like IPv4 /24 ☹️
- Noticeable increases:
 - According to RIR allocation boundaries
 - Along nibble boundaries



Internet Routing Table Analysis Update

Questions?