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AUD 2.7 million allocated to **69** projects from **22** AP economies and **55** recipients benefited from **13** Capacity Building opportunities!





Grants open until 31 May 2016

Internet Operations Research

on availability, reliability, and security of the Internet

Cybersecurity

resiliency and security to enhance user confidence in Internet-based services and secure routing

Technical Innovation

access provision, electricity supply, devices, IoT, IPv6, and privacy

Community Impact

women & girls in IT, democracy enhancement, open data, applications for economic empowerment, poverty alleviation, health and education

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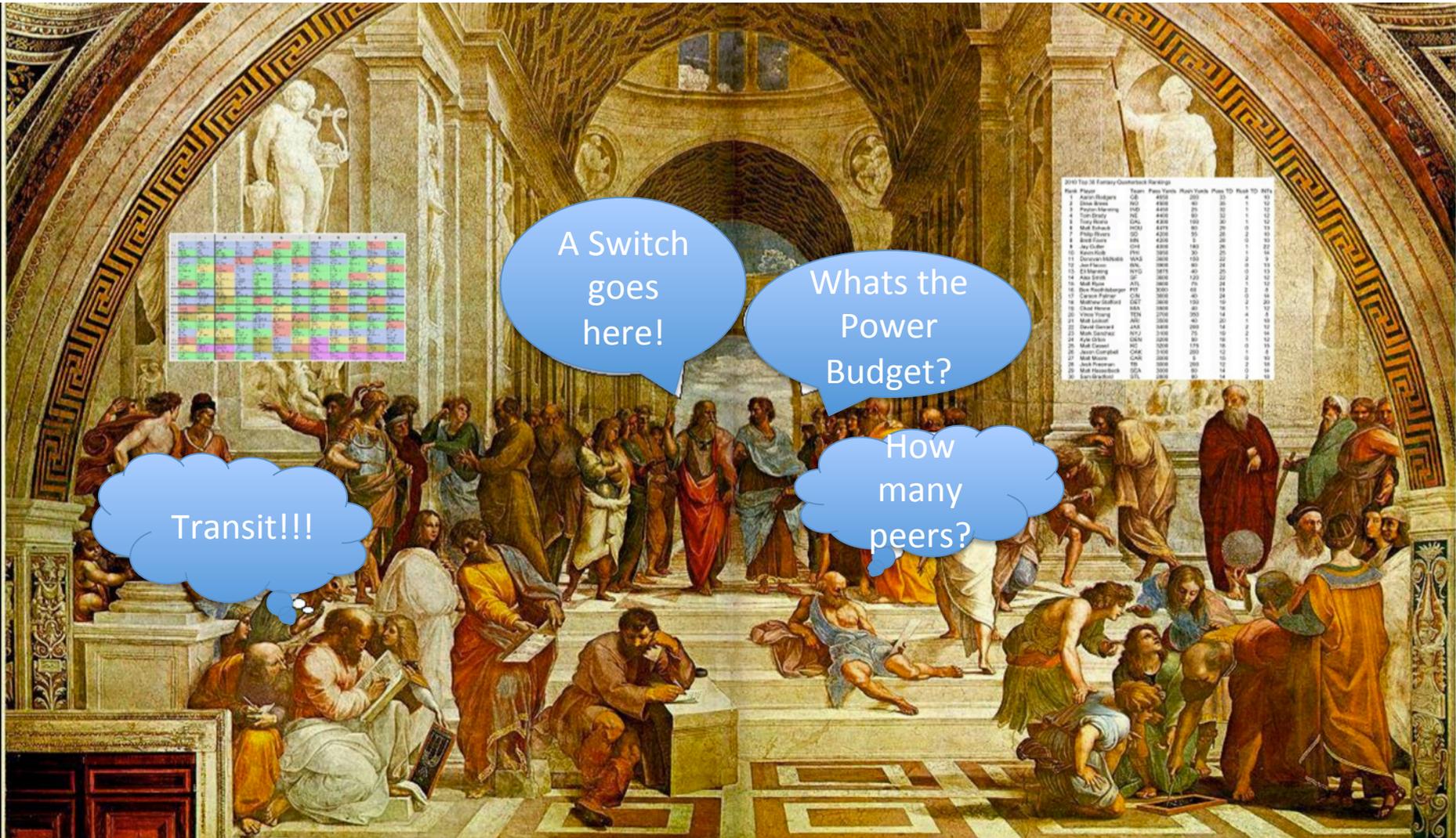
What's out there in Thailand?

ggm@apnic.net

Apologies

- To you.. For having to watch it
- Art lovers the world over for abuse of the great masters
- For more betterer gooder:
 - <http://classicprogrammerpaintings.com>

Planning the new IXP



Raphael: The School of Athens (1509-11)

Goals

- Look in the public APNIC data, BGP, measurements
- Try and understand the Thai Internet
- Explore what's going on with the participants
- Where to next?

Uh-oh...



Mordor from Peter Jackson's LoTR

Motivations

- Stale web data, looking to refresh
 - Build out per-economy information in the public web
 - Automate some information for packs, web/blogs
- Provide information to help decision making
 - Are we getting the network we want?
 - Do we need changes in address policy?
 - What's the long-term goal and investment need?

Phew!



William Blake: Newton (1795-1805)

Why Public Data?

- Anyone can do this: no magic sources
 - Ok some magic: the UN/ITU data requires some processing
 - Some data (measurements) can't be public but the reductions to Economy/AS level can be
- Reproducible
- Continuing information
 - Check progress over time

Public data

- The delegated files

```
apnic|AU|ipv4|1.0.0.0|256|20110811|assigned|A91872ED|e-stats
apnic|CN|ipv4|1.0.2.0|512|20110414|assigned|A92E1062|e-stats
apnic|CN|ipv4|1.0.8.0|2048|20110412|assigned|A92319D5|e-stats
apnic|JP|ipv4|1.0.16.0|4096|20110412|assigned|A92D9378|e-stats
```

- Common across all RIR. Complete
- Assigns all INR to an economy

- BGP dumps (route views, RIPE)

- Origin AS, Path, Prefixes visible

```
show ip bgp
```

```
BGP table version is 0, local router ID is 203.133.248.2
```

```
Status codes: s suppressed, d damped, h history, * valid, > best, i - internal,
               r RIB-failure, S Stale, R Removed
```

```
Origin codes: i - IGP, e - EGP, ? - incomplete
```

Network	Next Hop	Metric	LocPrf	Weight	Path
* 1.0.4.0/24	202.12.28.1			0 4777 2516 4637 1221 38803 56203	i
*>	203.133.248.254			0 4608 1221 38803 56203	i

Removing the old cabling



Studio of Fedele Fischetti: Alexander cutting the Gordian knot (Naples 1734-1789)

After a long nights cabling



William Blake: Nebuchadnezzar (1795)

Processing

Processing

- Tag Prefixes, ASN by economy (delegated)
 - As seen in BGP (routable, visible)
- Tag successful tests of IPv6 by prefix, economy
- Count by ASN, Economy
 - In future maybe by RIR member?
- Collate with UN/ITU data. Derive products
 - Prefixes/User. ASNs per GDP. Visible vs Allocated
- Tabulate and Plot

Thailand (.TH)



68,117,367 people

23,772,961 users

35% penetration

470 ASes

404.82B GDP

IPv4

298 in BGP

9,016,320 addresses

0.13 per head

93% visible

IPv6

64 in BGP

347,894 M addresses

5,107 per head

15% visible

0% capability

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IPv4	298 in BGP	IPv6	64 in BGP	BGP Data
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9,016,320 addresses	347,894 M addresses	RIR Data
---------------------	---------------------	----------

0.13 per head

5,107 per head

93% visible	15% visible	BGP Data
-------------	-------------	----------

	0% capability	Measured Data
--	---------------	---------------

Thailand (.TH)



68,117,367	people	ITU/UN Data
23,772,961	users	
35%	penetration	Derived Data
470	ASes	RIR Data
404.82B	GDP	ITU/UN Data

IPv4	298 in BGP	IPv6	64 in BGP	BGP Data
9,016,320	addresses	347,894	M addresses	RIR Data
0.13	per head	5,107	per head	Derived Data
93%	visible	15%	visible	BGP Data
		0%	capability	Measured Data

Too many colours



Bridget Riley, Fête 1989

Thailand (.TH)



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404.82B GDP

IPv4

298 in BGP

9,016,320 addresses

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IPv6

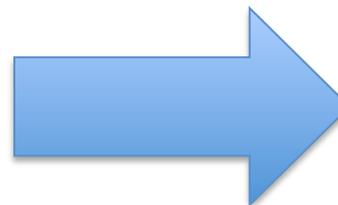
64 in BGP

347,894 M addresses

5,107 per head

15% visible

0% capability



Where's the IPv6?

- Its been allocated:
 - significantly more per head of population available right now, than IPv4
- Thailand has a lot by ISP
 - 110 discrete /32 allocations in delegated file to 92 organisations
- It's not being routed by the ASN? Sure is!
 - 64 active ASN visible in IPv6 BGP
- It's not visibly in use by our measurements
 - (more on this later)

IPv6 capability TH

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS45456	NETTREE-AS-AP Nettree Co. Ltd.	98.23%	97.35%	226
AS131221	PBRU-AS-AP Petchaburi Rajabhat Uni	90.06%	88.23%	875
AS131246	LRU-AS-AP LOEI university network	64.35%	60.65%	460
AS24453	CRU-AS-AP Chandrakasem Rajabahat	64.28%	60.89%	1327
AS38296	NSTDA-TH-AS-AP National Science and Technology Development Agency	50.43%	34.48%	232
AS133042	OBEC-AS-AP Office of the basic education commission	37.85%	34.55%	19959
AS133919	RMUTP-AS-AP Rajamangala U of T Phra Nakhon	31.61%	31.29%	310
AS9411	NONTRINET-AS-AP Kasetsart University	30.89%	24.26%	13178
AS37932	RMUTI-AS-AP Rajamangala U of T Isan	17.43%	16.53%	1004
AS9464	PSU-TH-AS-AP Prince of Songkla University	15.67%	12.06%	17086

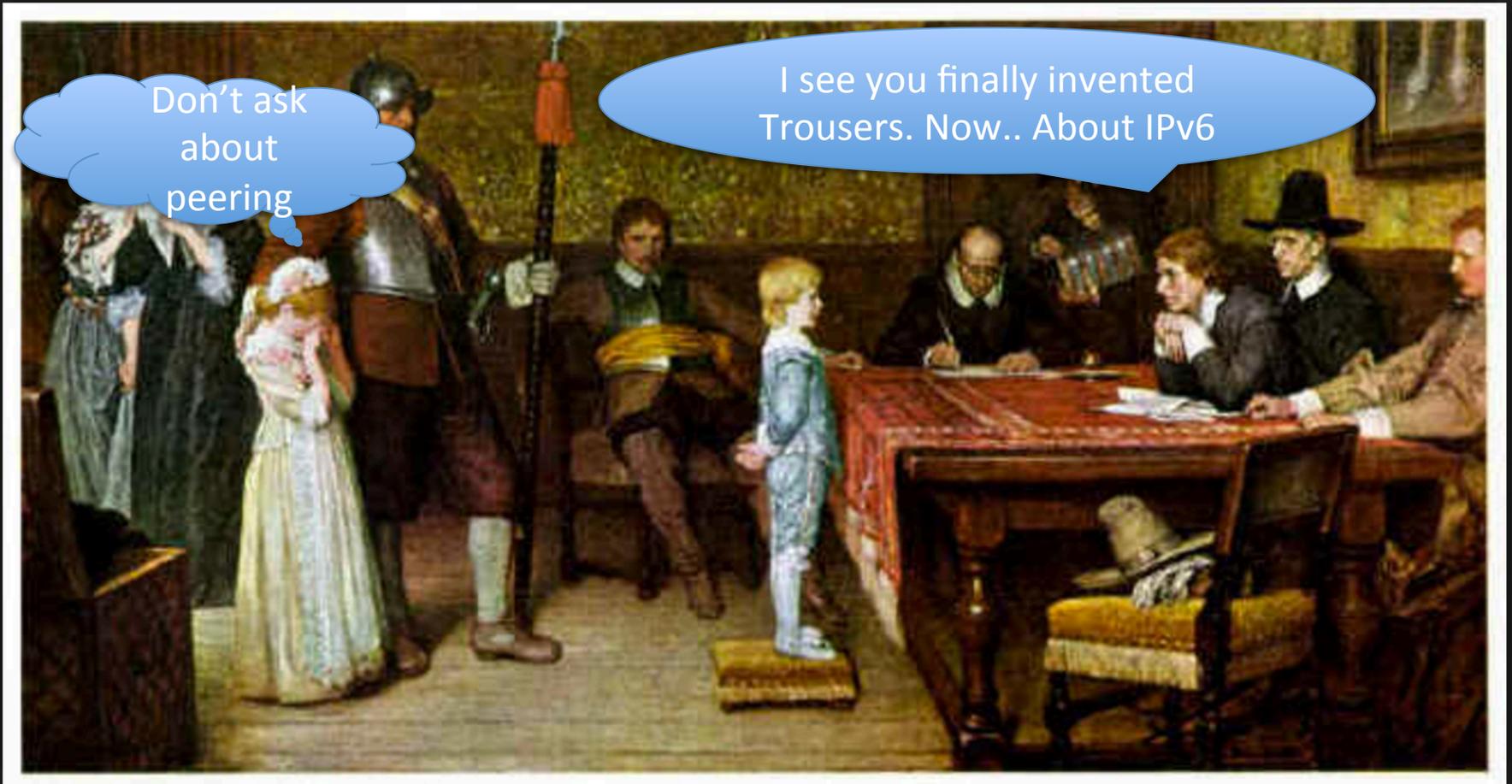
IPv6 capability by sample count TH

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS45629	JASTEL-NETWORK-TH-AP JasTel	0.00%	0.00%	3800229
AS17552	TRUE-AS-AP True Internet Co.,Ltd.	0.01%	0.00%	3438607
AS23969	TOT-NET TOT PLC	0.01%	0.00%	1692338
AS9737	TOTNET-TH-AS-AP TOT PLC	0.04%	0.00%	1540683
AS131445	AIS3G-2100-AS-AP Advance Wireless	0.00%	0.00%	1397816
AS132061	REALMOVE-AS-AP Realmove	0.00%	0.00%	1079005
AS24378	ENGTAC-AS-TH-AP Total Access Comms.	0.00%	0.00%	903911
AS131090	CAT-IDC-4BYTENET-AS-AP CAT PLC	0.03%	0.00%	520563
AS133481	SBN-FBB-AS-AP Fixed Broadband Network	1.32%	1.25%	284342
AS132619	REALFUTURE-AS-AP Real Future Company Ltd	0.00%	0.00%	147009



More on this one later...

We need to talk about this...



William Frederick Yeames "And When Did You Last See Your Father?" (1878)

This isn't a bad story

- VIZas only shows public peerings visible in BGP dumps
 - You can (and very probably do) have better paths
- IPv6 peering is often sparse – you aren't worse than many other economies
 - But you could be better.
- It's reasonably obvious where the IX opportunities are

How about other views?

- RIPE NCC have active probes (Atlas) and are able to measure traffic flows as seen by these devices between ASN in the same Economy
- In their own words (from a pack by Mirjam Kühne, Fergal Cunningham, RIPE NCC presented to the NIX meeting Feb 2016)



RIPE Atlas IXP Country Jedi

- IXP-Country-jedi
 - Are the paths between ASes staying in the country?
 - What is the difference between IPv6 & IPv4?
 - How many paths go via a local IXP?
 - Which peer could you add to improve reachability?
- Experimental tool
 - Feature requests welcome!
 - Depends on probe distribution in a country

IXP Country Jedi



- Tool & concept by Emile Aben
 - <https://github.com/emileaben/ixp-country-jedi>
 - <https://labs.ripe.net/Members/emileaben/measuring-ixps-with-ripe-atlas>
- traceroute mesh between RIPE Atlas probes
 - Identify ASNs in the country using RIPEstat
 - Identify IXPs & IXP LANs using PeeringDB
 - Mesh: from a set of probes in a country to each other
 - Max 2 probes per ASN
 - Only “public” probes with “good” geolocation
 - Hops geolocated using “OpenIPMap” database

Thailand by prefix-country-jedi



<http://sg-pub.ripe.net/emile/ixp-country-jedi/history/2016-05-01/TH/geopath/>

Actions



- Use this tool to find possible suboptimal routing
 - Find your ASN in the mesh, find the person from another ASN, have tea :)
- To improve accuracy of this diagnostic tool
 - If your ASN is not on the graph, **apply for a RIPE Atlas probe**
 - If you move, remember to update your probe's geolocation
- Re-use & re-write the code: it is free & open source software
- Improve infrastructure geolocation: contribute data to OpenIPMap!

So it could be better.

- Some visible outside-economy paths being taken.
- Maybe its fringe, but I think it would pay to talk about peering, and what you want for customer experience in Thailand
 - Packets are taking long-delay paths
- I think Thailand needs you to work on IPv6 announcement and peering
 - Not enough ASN are announcing what they have

How did we get here?

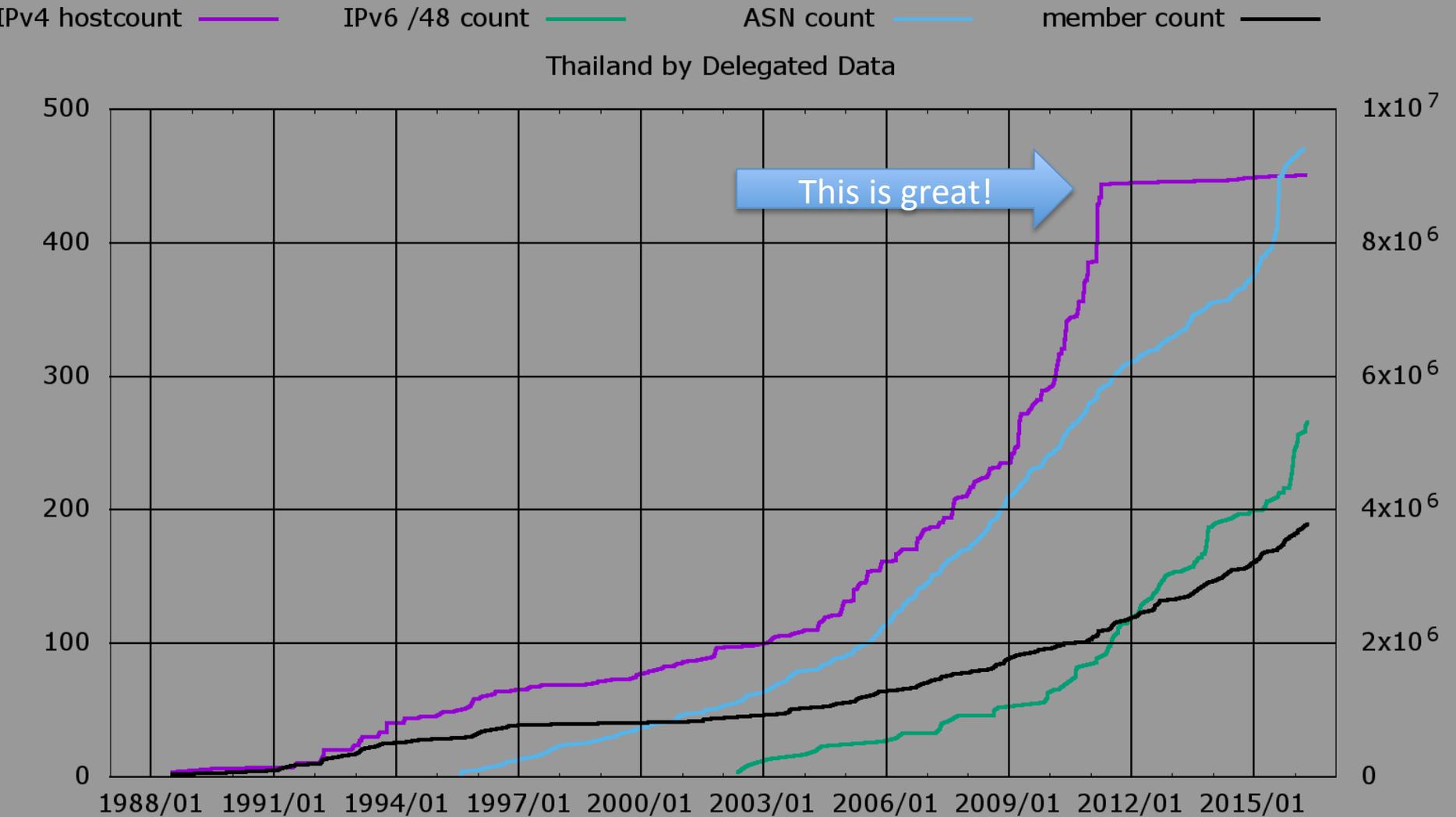


Masaccio - The Expulsion from the Garden of Eden (detail) – (1425)

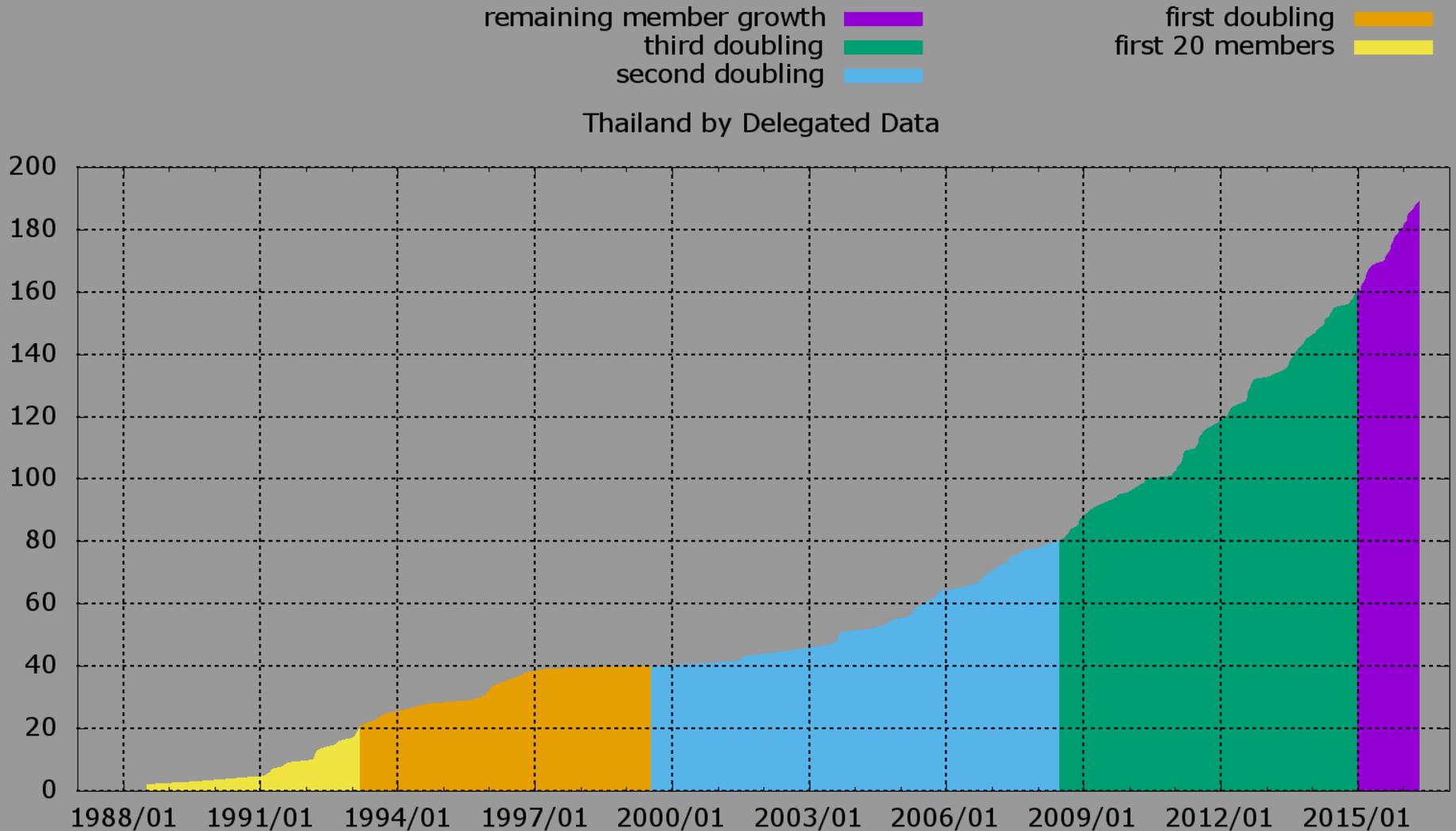
History from delegated

- Take inception dates for resources and unique IDs from delegated file
- Order by first-seen, count
- Plot the natural doublings in time
- How did Thailand emerge, as an Internet economy in this view?

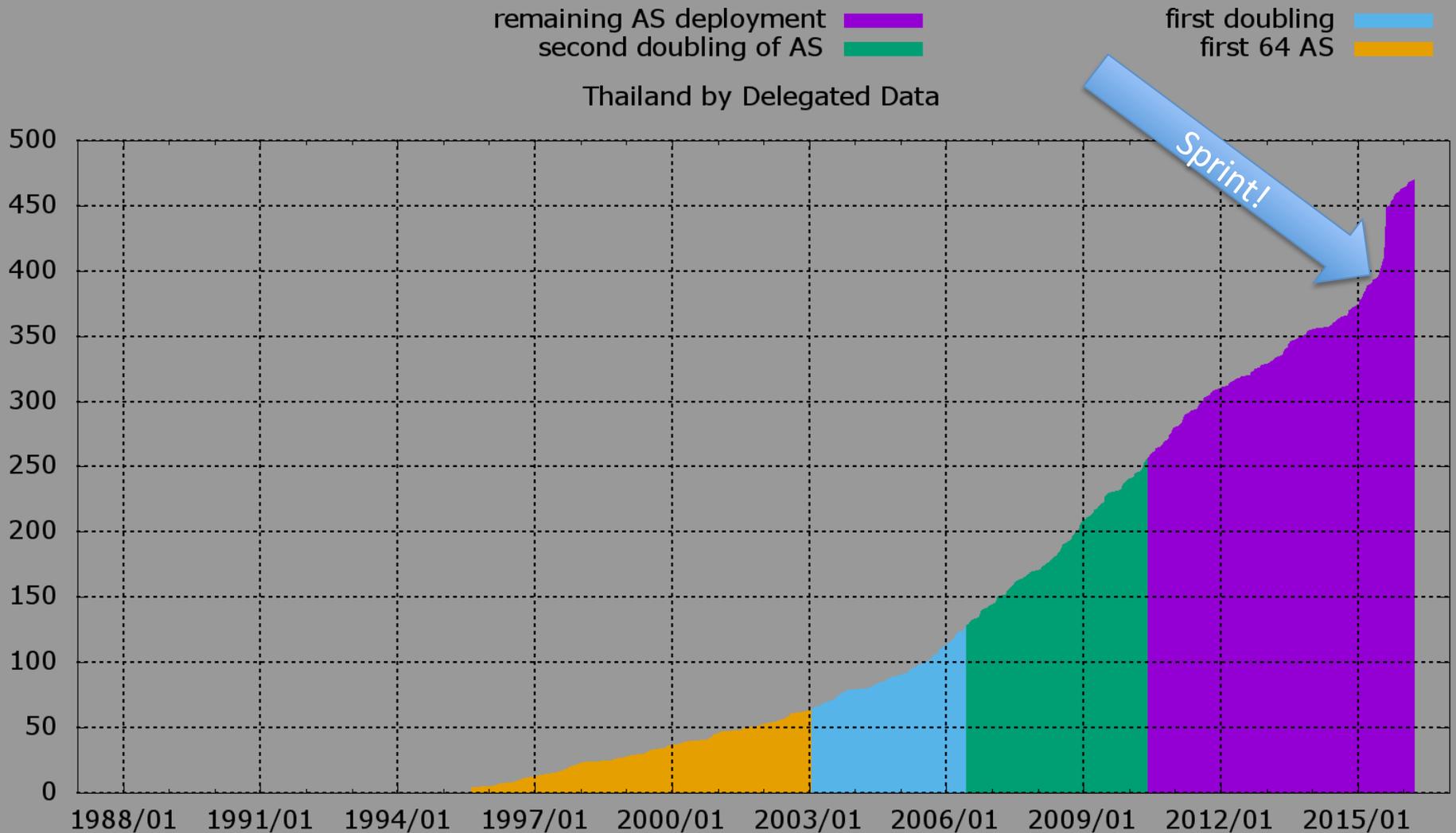
History of growth of Internet TH



RIR membership by time



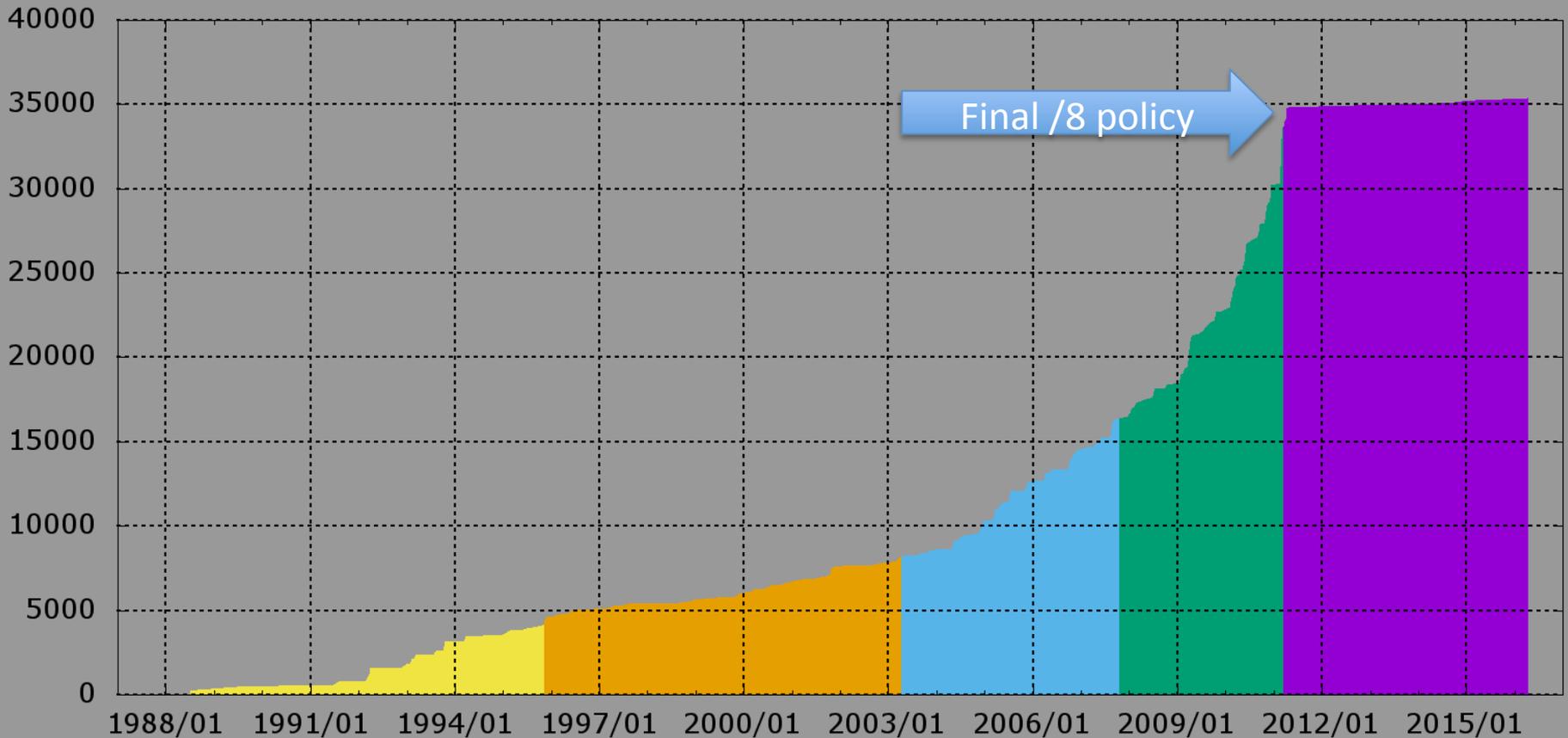
ASN doubling by time



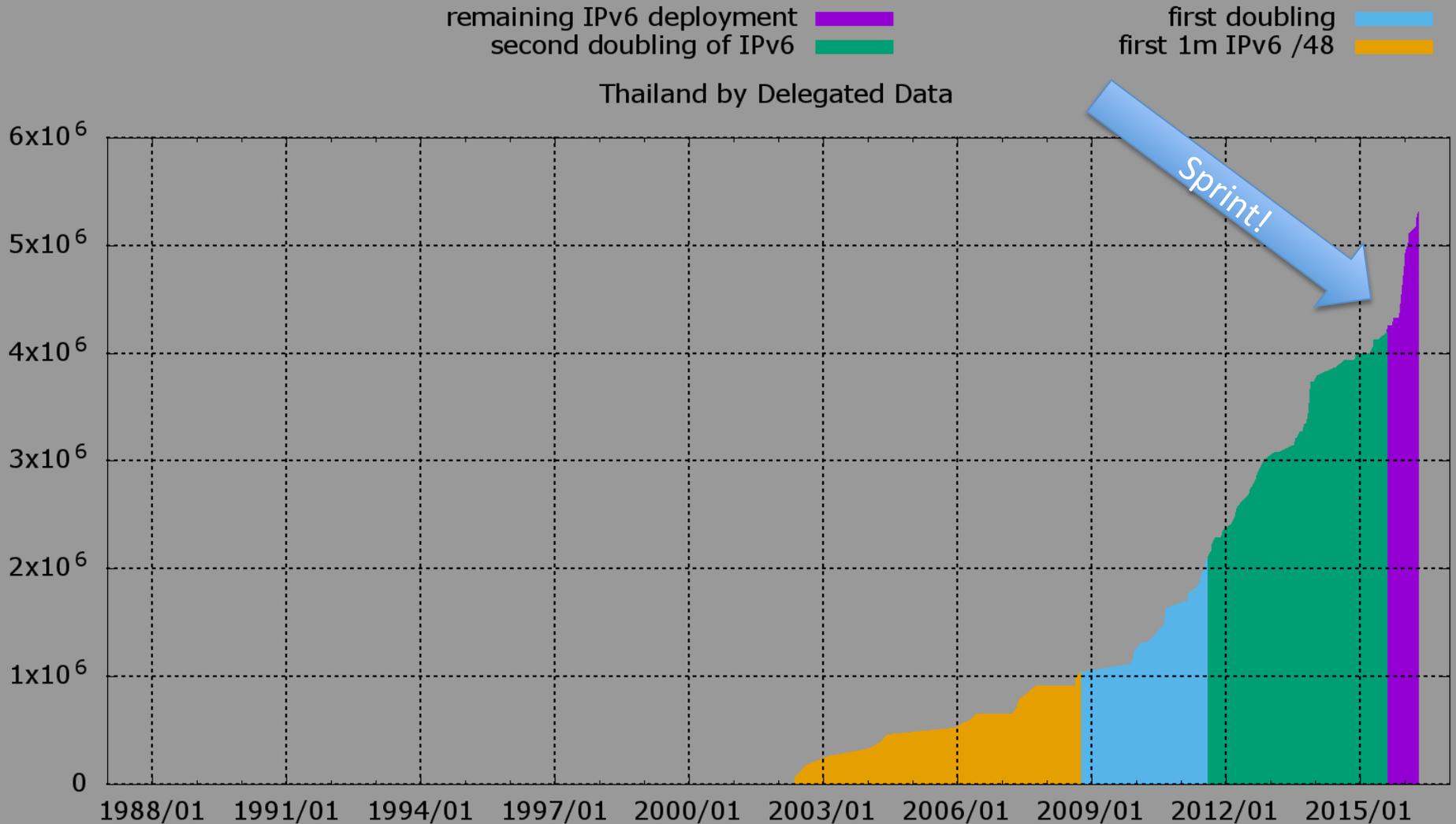
IPv4 /24 by time



Thailand by Delegated Data



IPv6 /48 by time

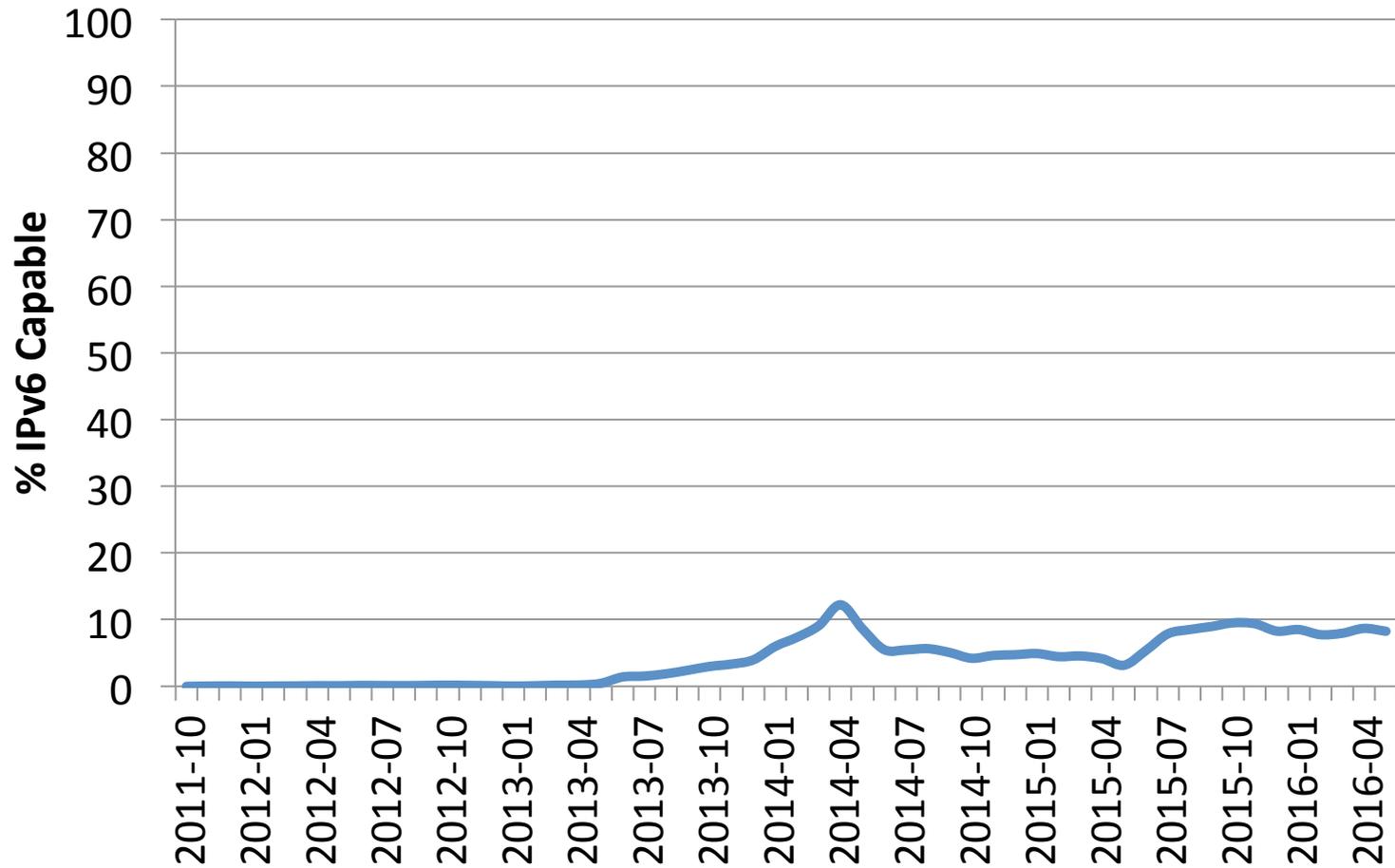


Whats going on in the 'hood?

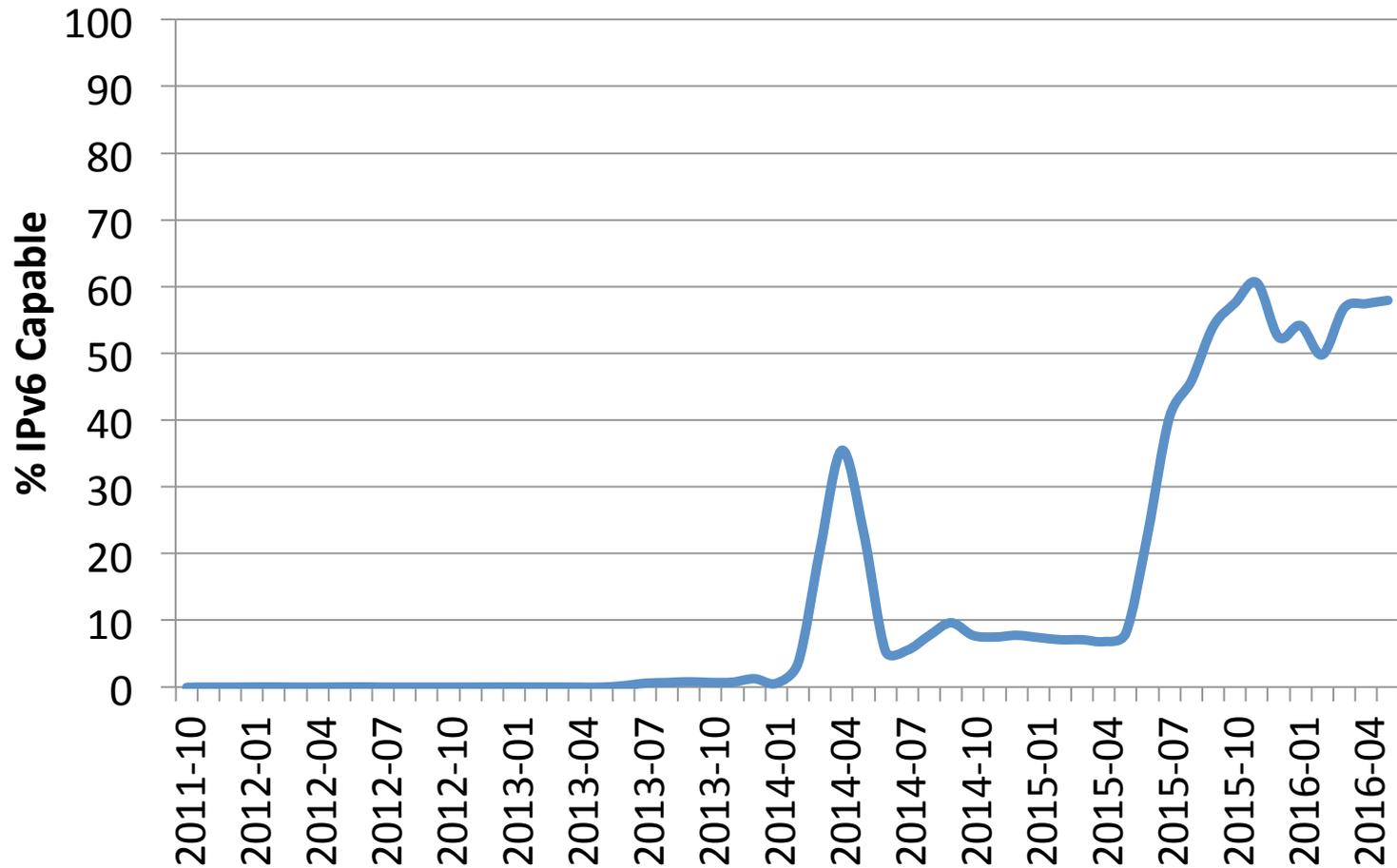
What we see in measurement

- End user sample driven measurement of activity
- Ranking by samples equates to random placement share of eyeballs
 - Its not market share, but its interesting
- Capability shows who is doing end-user IPv6
- Lets go see...

IPv6 Capability:SG



IPv6 Capability:AS10091 (StarHub)



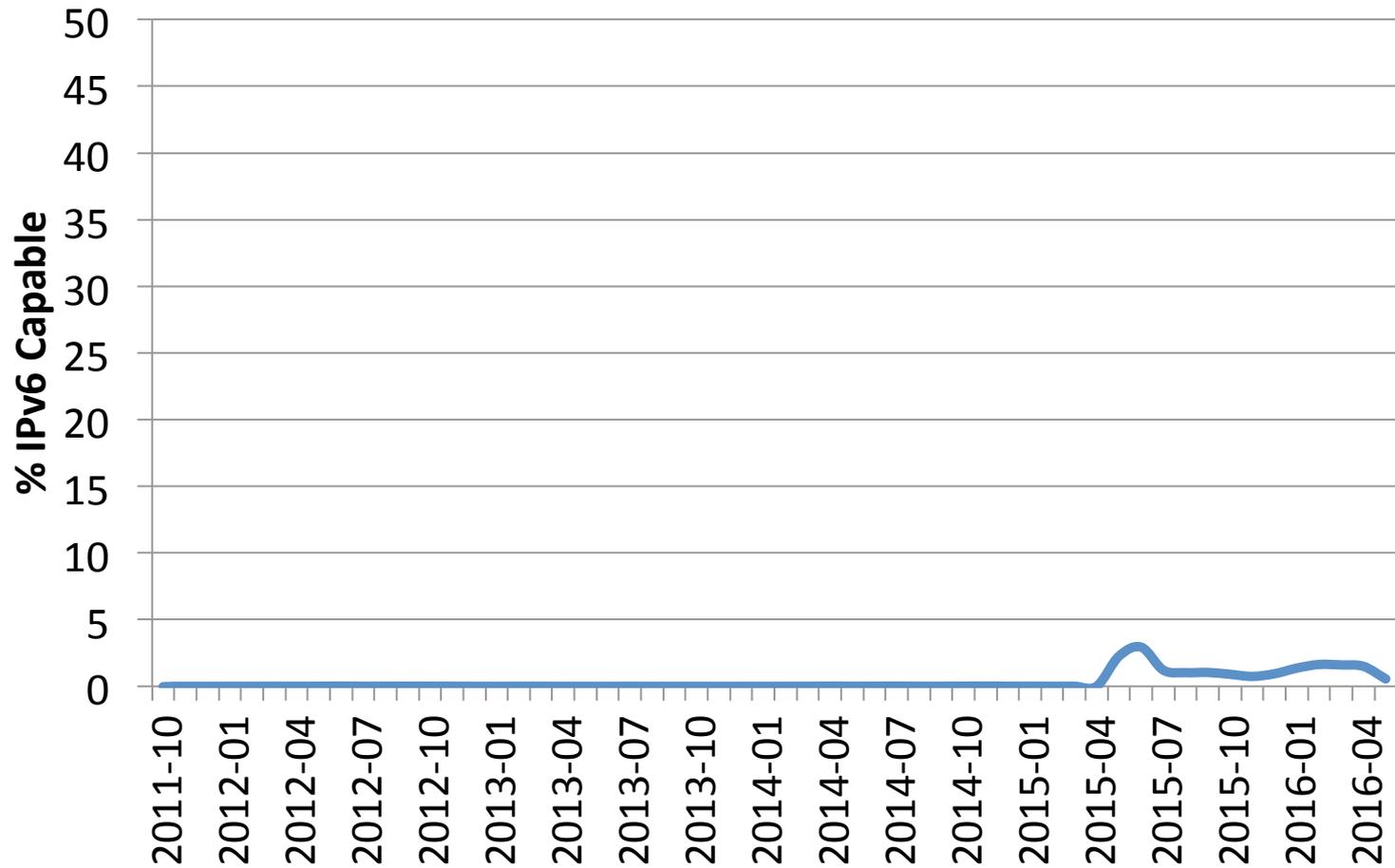
IPv6 capability

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS56173	YAHOO-SG3 internet content provider	98.11%	85.61%	264
AS59349	GMOINTERNET-SG GMO INTERNET PTE LTD	86.47%	85.18%	1545
AS132816	SIMPLERCLOUD-AS-AP SimplerCloud Pte Ltd	57.34%	55.96%	218
AS10091	SCV-AS-AP StarHub Cable Vision Ltd	56.07%	36.51%	400761
AS109	CISCOSYSTEMS - Cisco Systems, Inc.	45.53%	40.92%	369
AS24482	SGGS-AS-AP SG.GS	27.36%	21.95%	870
AS133165	DIGITALOCEAN-AS-AP Digital Ocean, Inc.	23.25%	4.43%	21689
AS56308	TELIN-NET-SG TELEKOMUNIKASI INDONESIA	11.97%	7.69%	234
AS3598	MICROSOFT-CORP-AS - Microsoft Corporation	8.60%	7.84%	791
AS4773	MOBILEONELTD-AS-AP MobileOne Ltd	6.69%	5.96%	563862

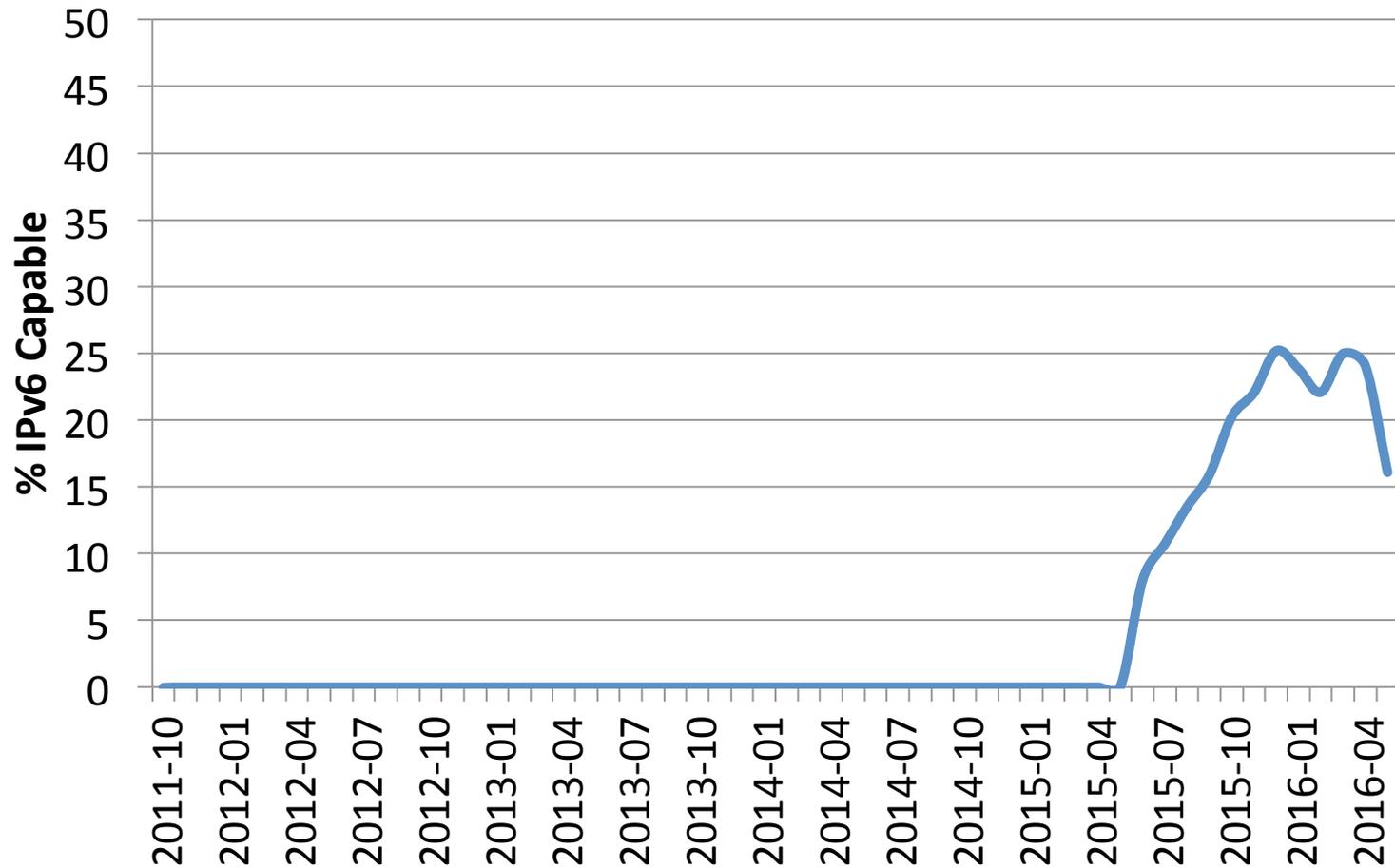
IPv6 capability by sample count

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS9506	MAGIX-SG-AP Magix Broadband Network	0.33%	0.08%	1612666
AS55430	STARHUBINTERNET-AS-NGNBN Starhub	5.98%	4.16%	852324
AS4773	MOBILEONELTD-AS-AP MobileOne Ltd.	6.69%	5.96%	563862
AS10091	SCV-AS-AP StarHub Cable Vision Ltd	56.07%	36.51%	400761
AS45143	SINGTELMOBILE-AS-AP SINGTEL	0.10%	0.04%	155192
AS9874	STARHUB-IX StarHub Broadband	0.14%	0.06%	108163
AS56300	MYHOSTING-AS-AP MYHOSTING	0.04%	0.00%	96047
AS38895	AMAZON-AS-AP Amazon.com Tech Telecom	0.01%	0.00%	38135
AS4657	STARHUBINTERNET-AS StarHub Internet	0.04%	0.02%	26935
AS3758	ERX-SINGNET SingNet	1.05%	0.06%	26791

IPv6 Capability:KR



IPv6 Capability:AS9644 (SKTelecom)



IPv6 capability

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS55536	PSWITCH-HK PACSWITCH GLOBAL IP NETWORK	98.56%	0.00%	4584
AS9644	SKTELECOM-NET-AS SK Telecom	24.64%	23.41%	208757
AS1237	KREONET-AS-KR Korea Inst. of Sci & Tech	1.68%	1.68%	2201
AS9848	GNGAS Enterprise Networks	0.74%	0.00%	2157
AS10036	CNM-AS-KR CM Communication Co.,Ltd.	0.65%	0.65%	82187
AS45365	URINET-AS-KR Korea Cable TV Jeonboog	0.59%	0.59%	1191
AS23576	NHN-AS-KR NHN	0.51%	0.51%	3138
AS9686	SKKUNET-AS SungKyunKwan University (SKKU)	0.27%	0.22%	1826
AS10052	KNU-AS Kyungpook National Univ.	0.19%	0.00%	529
AS9274	PUSAN-AS-KR Pusan National University	0.10%	0.00%	993

IPv6 capability by sample count

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS4766	KIXS-AS-KR Korea Telecom	0.04%	0.04%	1939863
AS9318	HANARO-AS Hanaro Telecom Inc.	0.02%	0.01%	597739
AS17858	KRNIC-ASBLOCK-AP KRNIC	0.00%	0.00%	433253
AS9644	SKTELECOM-NET-AS SK Telecom	24.64%	23.41%	208757
AS3786	LGDACOM LG DACOM Corporation	0.00%	0.00%	199758
AS17853	LGTELECOM-AS-KR LG Telecom	0.00%	0.00%	122046
AS10036	CNM-AS-KR CM Communication Co.,Ltd.	0.65%	0.65%	82187
AS16509	AMAZON-02 - Amazon.com, Inc.	0.01%	0.01%	57106
AS17839	DREAMPLUS-AS-KR DreamcityMedia	0.00%	0.00%	21643
AS17864	HANVITIAB-AS-KR Hanvit IB	0.00%	0.00%	20969

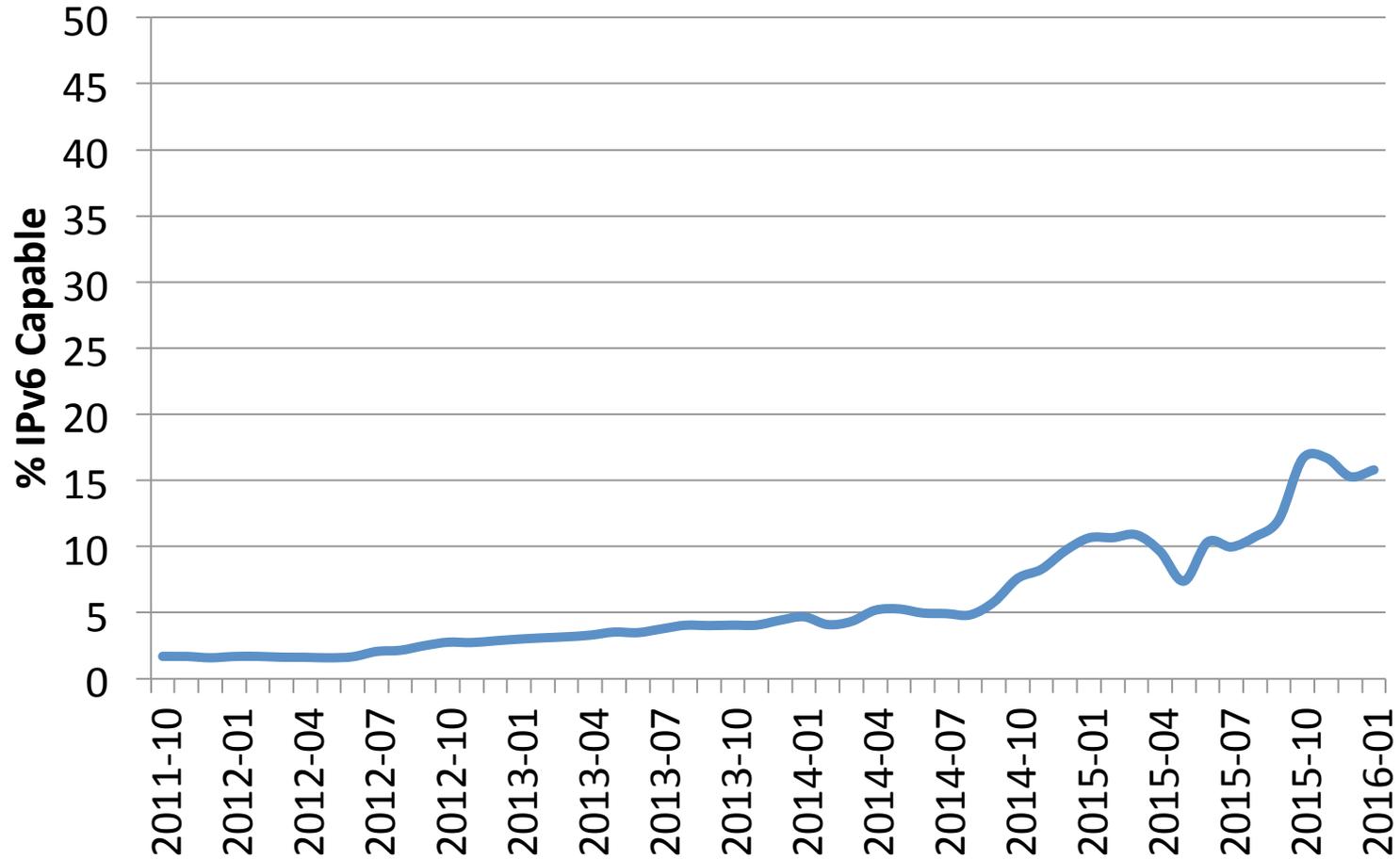
IPv6 capability (KH)

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS7712	SABAY Sabay Digital (Cambodia)	3.34%	3.28%	7163
AS45348	CHUANWEI-AS-KH Regency Square, Complex B	0.36%	0.32%	8123
AS131207	SINET-KH SINET,.	0.03%	0.03%	89594
AS23673	ONLINE-AS Cogetel Online, Cambodia, ISP	0.02%	0.00%	251030
AS9902	NEOCOMISP-KH-AP NEOCOMISP LIMITED.	0.02%	0.02%	6502
AS133070	STMG-AS-AP Supreme Telecomm Media Group	0.01%	0.01%	7469
AS45429	DTV-STAR-KH-AS-AP	0.01%	0.00%	907987
AS38623	VIETTELCAMBODIA-AS-AP	0.01%	0.00%	1459028
AS17976	CAMGSM-AS-AP Royal TeleCam Telesurf ISP	0.00%	0.00%	210655
AS45498	SMART-AXIATA-KH Monivong Blvd	0.00%	0.00%	547956

IPv6 capability by sample count MM

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS9988	MPT-AP Myanmar Posts and Telecomm	0.01%	0.00%	303009
AS133385	TELENORMYANMAR-AS Telenor Myanmar	0.00%	0.00%	198809
AS131322	YTCL-AS-AP Yatanarpon Teleport Co. Ltd	0.04%	0.00%	121472
AS132167	OML-MM OOREDOO MYANMAR	0.01%	0.00%	101101
AS133384	RCCL-AS-AP RedLink Comms Co., Ltd.	0.00%	0.00%	27634
AS18399	YTCL-AS-AP Yatanarpon Teleport Co. Ltd.	0.00%	0.00%	13080
AS133392	SKY-AS-AP Skynet MPS	0.00%	0.00%	6737
AS58952	FRONTIIRCOLTD-MM Frontiir Co. Ltd	0.00%	0.00%	2039

IPv6 Capability:JP



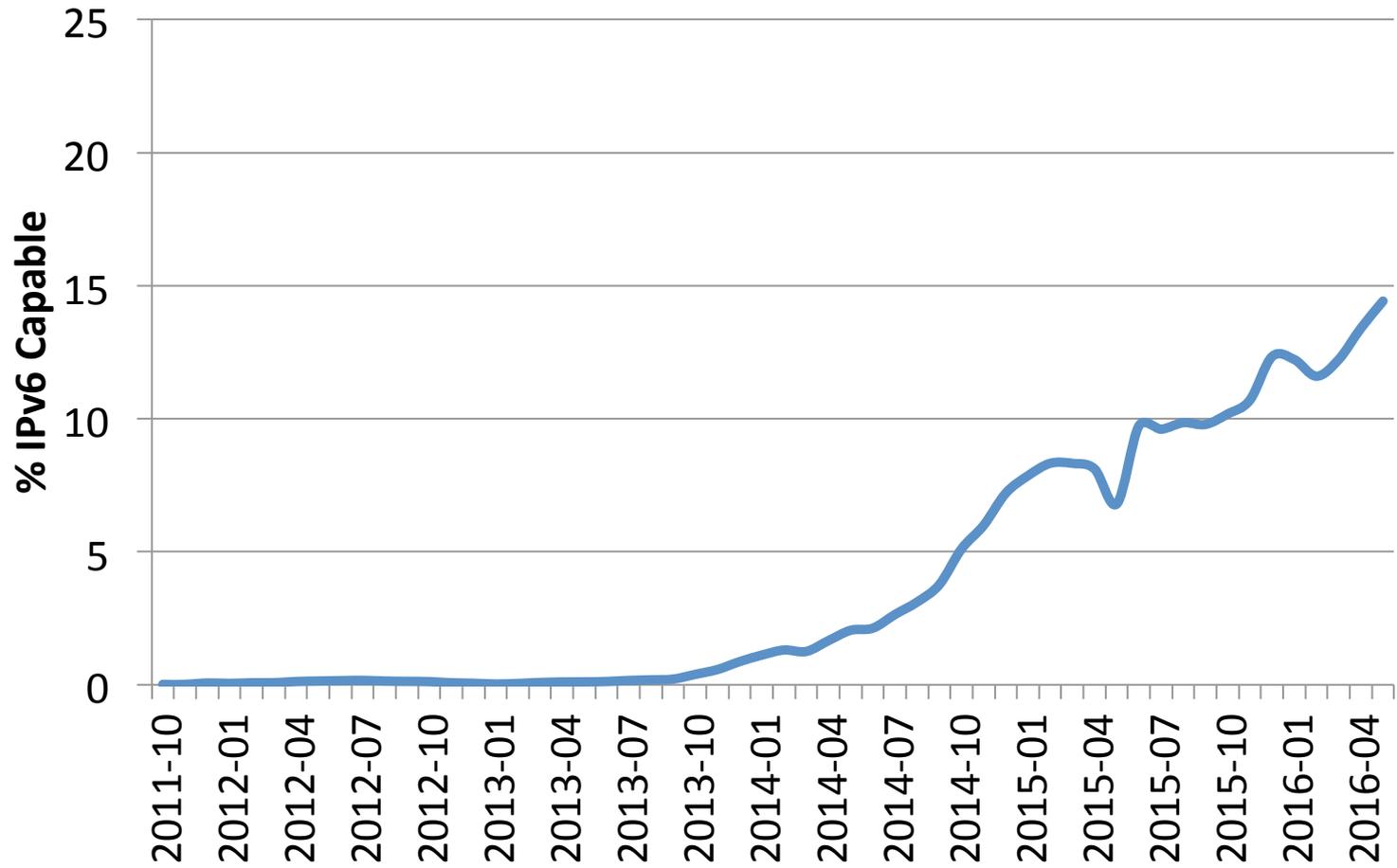
IPv6 capability

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS9619	SSD Sony Global Solutions Inc.	99.76%	98.78%	819
AS15169	GOOGLE - Google Inc.	99.19%	87.80%	246
AS55904	KOGAKUIN-AS KOGAKUIN University	98.02%	97.52%	202
AS18126	CTCX Chubu Telecomms Company, Inc.	73.96%	58.97%	30169
AS7506	INTERQ GMO Internet, Inc	73.52%	66.97%	14552
AS17932	JAIST Japan Advanced Inst. of Sci & Tech	71.11%	66.58%	1502
AS2506	SUPERCSI NTT WEST CHUGOKU Corp.	62.57%	60.97%	6375
AS7522	STCN STNet, Incorporated	55.19%	51.79%	10298
AS2516	KDDI KDDI CORPORATION	44.96%	38.56%	606856
AS38635	KEIO-NET Keio University	44.07%	34.00%	447

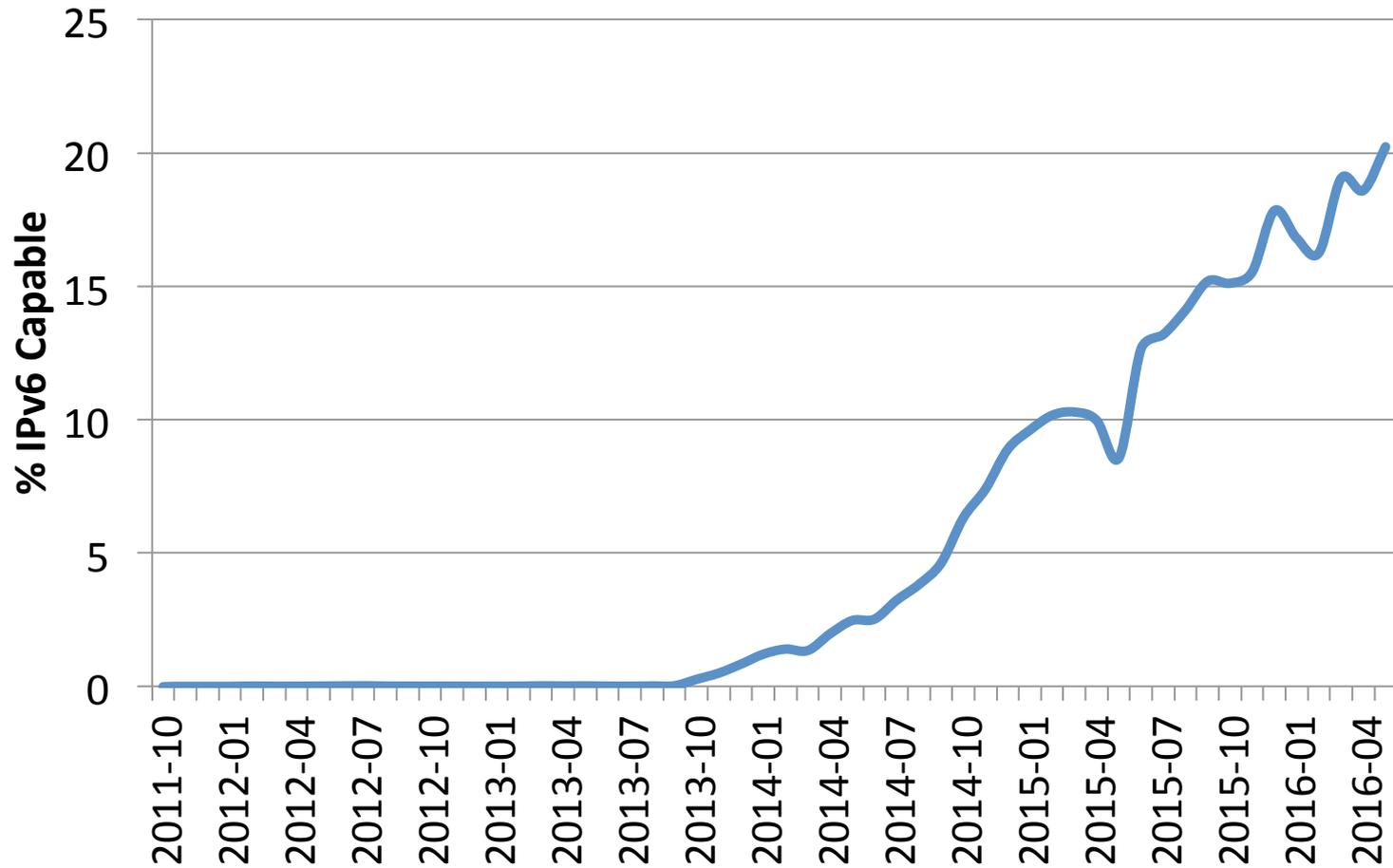
IPv6 capability by sample count

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS4713	OCN NTT Communications Corp.	2.71%	2.20%	703504
AS17676	GIGAINFRA Softbank BB Corp.	22.74%	20.62%	613944
AS2516	KDDI KDDI CORPORATION	44.96%	38.56%	606856
AS9605	DOCOMO NTT DOCOMO, INC.	0.02%	0.01%	121096
AS2527	SO-NET So-net Entertainment Corp.	31.27%	28.94%	105297
AS16509	AMAZON-02 - Amazon.com, Inc.	0.02%	0.01%	91457
AS2518	BIGLOBE BIGLOBE Inc.	1.22%	1.06%	83911
AS17511	K-OPTICOM K-Opticom Corporation	0.38%	0.23%	76354
AS9824	JTCL-JP-AS Jupiter Telecomms Co. Ltd	0.10%	0.03%	74660
AS10010	TOKAI TOKAI Communications Corp.	20.80%	17.71%	63430

IPv6 Capability:MY



IPv6 Capability:AS4788 (TMNET)



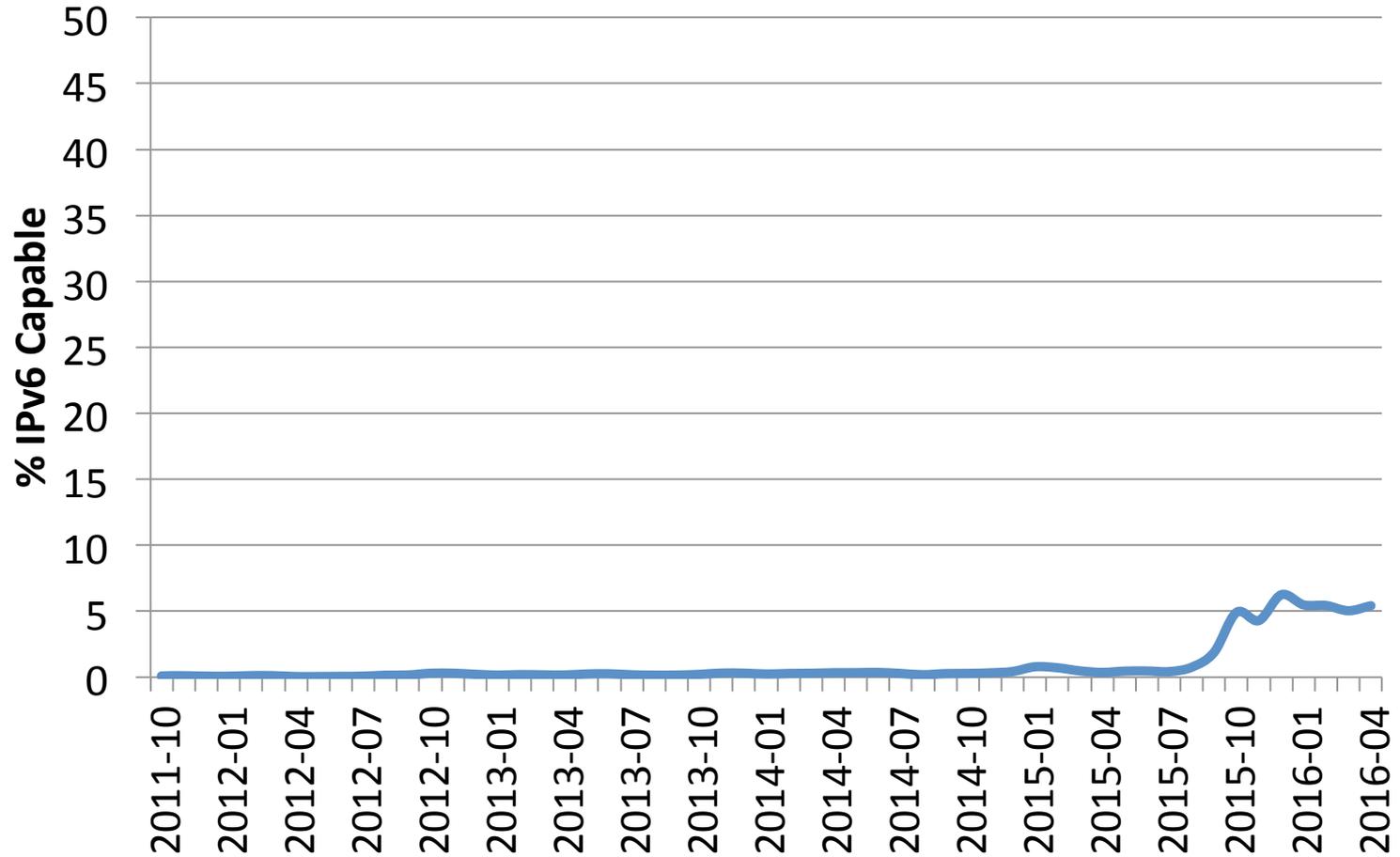
IPv6 capability

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS4788	TMNET-AS-AP TM Net, Internet Service Provider	18.40%	16.05%	5096347
AS17564	GITN-PCN-AS-AP GITN (M) Sdn. Bhd.	16.52%	14.04%	4208
AS38044	GITN-NETWORK GITN-NETWORK	5.57%	5.28%	17494
AS9930	TTNET-MY TIME dotCom Berhad	2.35%	2.06%	119253
AS38278	VTELECOMNET-MY-AP VTelecoms Berhad	1.38%	1.38%	290
AS36351	SOFTLAYER - SoftLayer Technologies Inc.	0.51%	0.00%	195
AS4818	DIGIIX-AP DiGi Telecommunications Sdn. Bhd.	0.37%	0.33%	284368
AS38466	UMOBILE-AS-AP U Mobile Sdn Bhd	0.30%	0.28%	179942

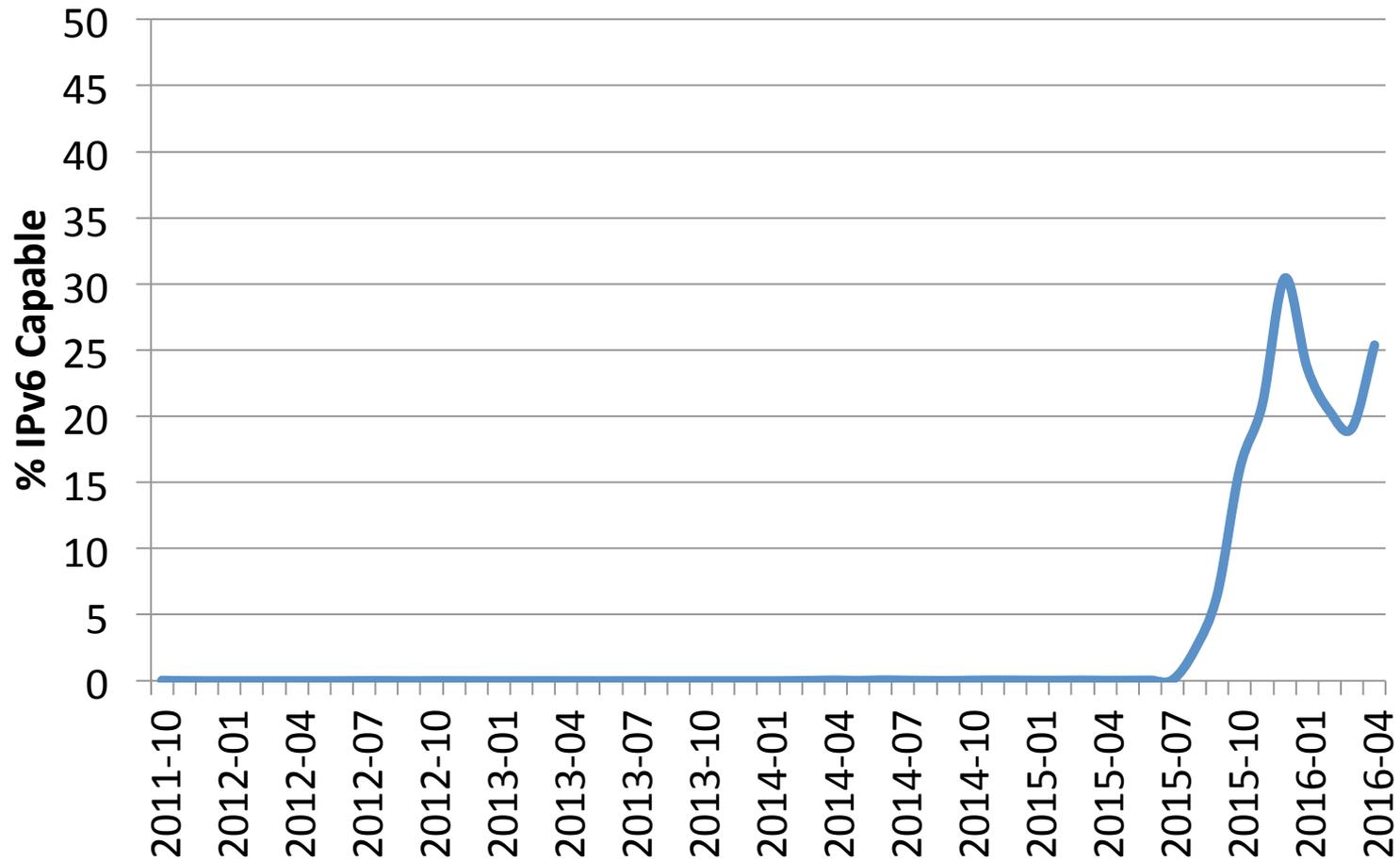
IPv6 capability by sample count

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS4788	TMNET-AS-AP TM Net, Internet Service	18.40%	16.05%	5096347
AS9534	MAXIS-AS1-AP Binariang Berhad	0.21%	0.18%	778711
AS10030	CELCOMNET-AP Celcom Internet Service	0.03%	0.01%	330107
AS4818	DIGIIX-AP DiGi Telecommunications Sdn. Bhd.	0.37%	0.33%	284368
AS38466	UMOBILE-AS-AP U Mobile Sdn Bhd	0.30%	0.28%	179942
AS45960	YTLCOMMS-AS-AP YTL Comms SDN BHD	0.00%	0.00%	153106
AS38322	P1NETWORKS-MY-AP Packet One Net. Sdn Bhd	0.00%	0.00%	144966
AS9930	TTNET-MY TIME dotCom Berhad	2.35%	2.06%	119253
AS38044	GITN-NETWORK GITN-NETWORK	5.57%	5.28%	17494
AS38182	EXTREMEBB-AS-MY Extreme Broadand	0.02%	0.01%	9296

IPv6 Capability:GB



IPv6 Capability:AS5607 (Sky)



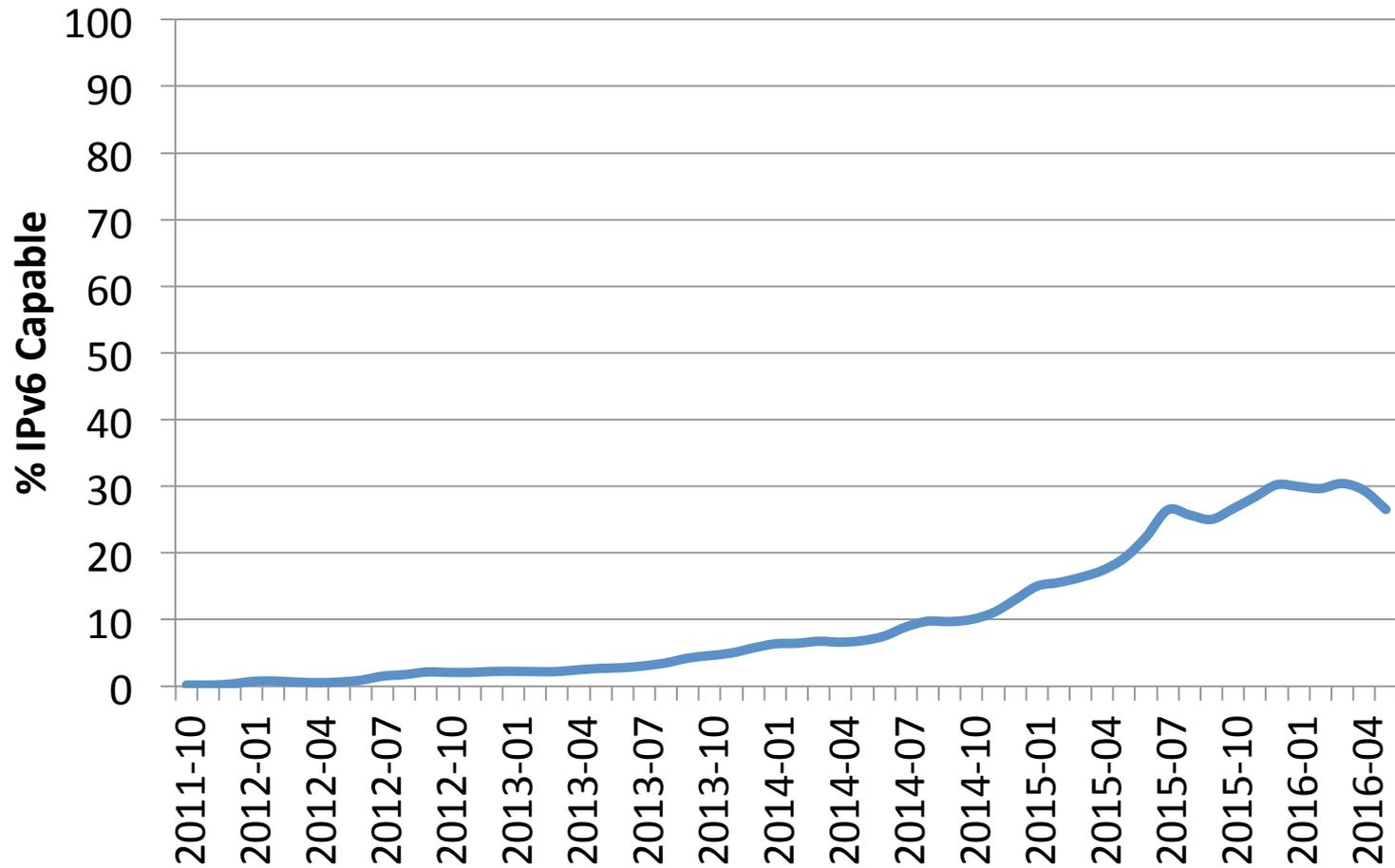
IPv6 capability

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS54115	FACEBOOK-CORP - Facebook Inc	96.54%	93.29%	492
AS25926	HOSTUS-SOLUTIONS-LLC - HostUS	87.80%	86.83%	205
AS28715	BRASSHORNCOMMS Brass Horn Comms	78.17%	76.65%	788
AS21321	ARETI-AS Areti Internet Ltd.	62.26%	62.16%	5032
AS15830	TELECITY-LON TELECITYGROUP Intl.	56.84%	56.70%	34847
AS109	CISCOYSTEMS - Cisco Systems, Inc.	50.94%	48.08%	4307
AS58252	ASN-RINGCLOUD Netuity Limited	49.04%	48.90%	4564
AS20712	AS20712 Andrews Arnold Ltd	48.54%	47.03%	1129
AS12496	IDNET Infinity Developments Limited	44.89%	40.05%	1116
AS15395	Rackspace Ltd.	43.10%	4.09%	587

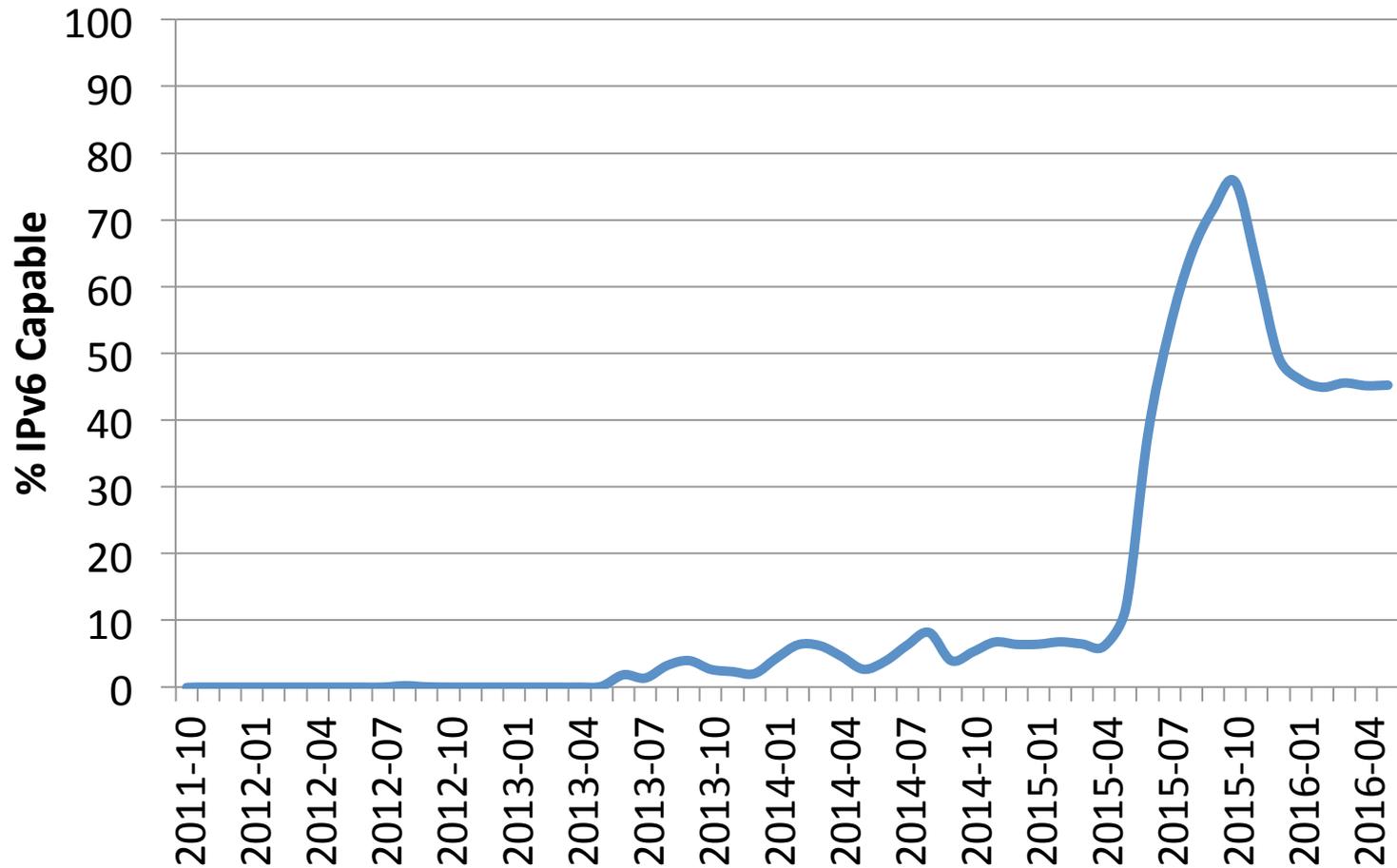
IPv6 capability by sample count

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS5607	BSKYB-BROADBAND-AS Sky UK Limited	22.09%	21.26%	1227317
AS5089	NTL Virgin Media Limited	0.02%	0.02%	1191125
AS43766	MTC-KSA-AS MTC KSA	0.00%	0.00%	1104078
AS2856	BT-UK-AS British Telecommunications PLC	0.16%	0.15%	1063464
AS13285	OPALTELECOM-AS TalkTalk Comms	0.00%	0.00%	313021
AS12576	ORANGE-PCS EE Limited	0.03%	0.01%	238995
AS9105	TISCALI-UK Tiscali UK Limited	0.02%	0.02%	210918
AS9009	M247 M247 Ltd	0.03%	0.02%	163424
AS60339	H3GUK Hutchison 3G UK Limited	0.02%	0.01%	155399
AS6871	PLUSNET PlusNet plc.	0.07%	0.06%	131010

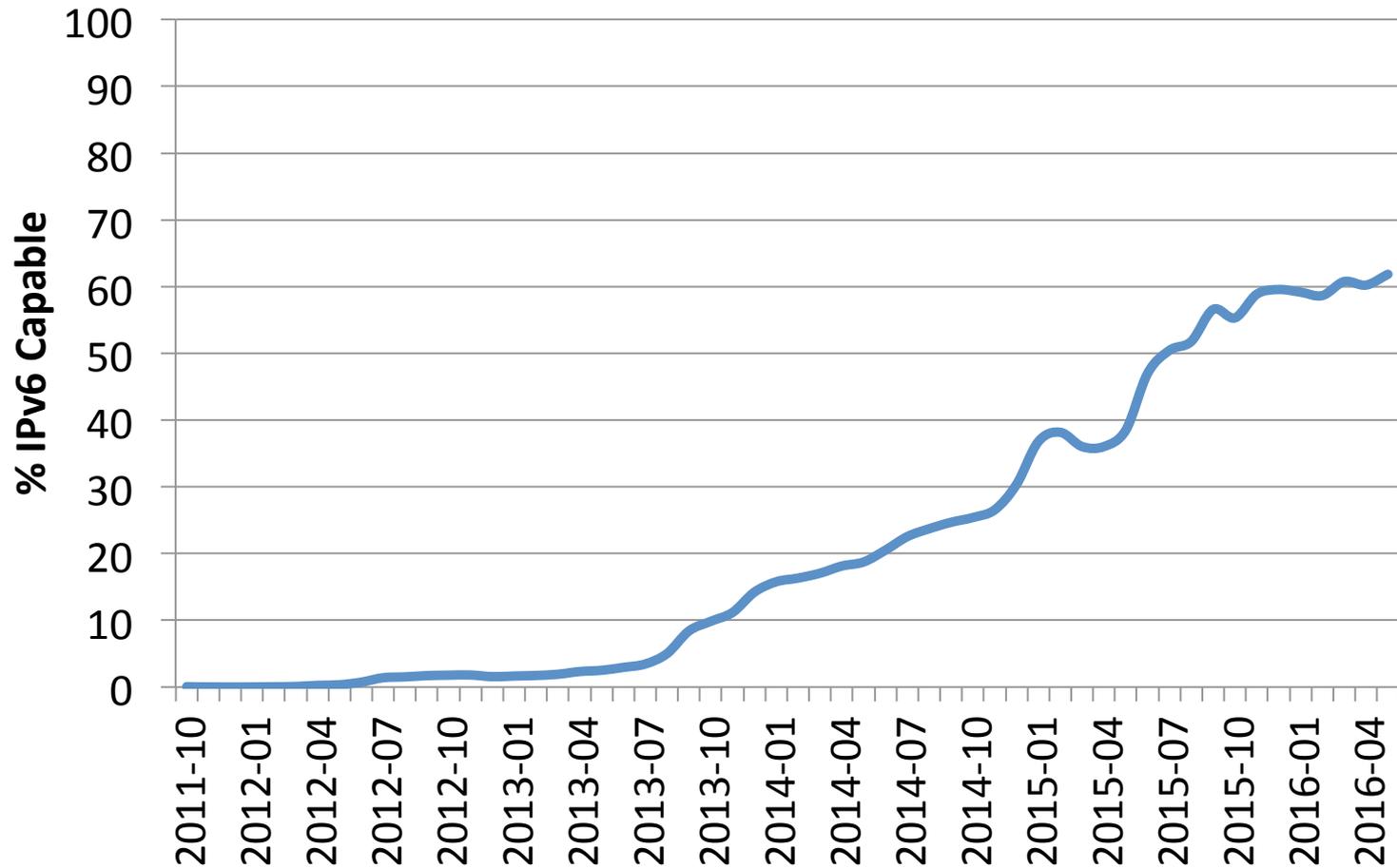
IPv6 Capability:US



IPv6 Capability:AS21928 (T-Mobile)



IPv6 Capability:AS7922 (comcast)



IPv6 capability

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS32934	FACEBOOK - Facebook, Inc.	99.98%	99.84%	66251
AS26729	MW-NET-AS - Midwest Internet, Inc.	99.81%	0.04%	2572
AS4266	CERNET-ASN-BLOCK California Ed. and Res. Fed.	99.03%	98.94%	1133
AS47583	HOSTINGER-AS Hostinger International Limited	98.73%	96.25%	2054
AS49532	SERVERHUB-DE Eonix Corporation	97.93%	97.93%	242
AS27357	RACKSPACE - Rackspace Hosting	97.67%	96.63%	8794
AS36384	GOOGLE-IT - Google Incorporated	97.00%	96.36%	3873
AS12180	INTERNAP-2BLK - Internap Network Corp.	96.84%	96.67%	1141
AS60558	SECUREDSERVERS-EU PHOENIX NAP, LLC.	95.28%	0.34%	890
AS17234	GAC - Gustavus Adolphus College	93.16%	89.39%	424

IPv6 capability by sample count

ASN	AS Name	IPv6 Capable	IPv6 Preferred	# Samples
AS7922	COMCAST-7922 - Comcast Cable Comms , Inc.	60.23%	55.41%	14577300
AS7018	ATT-INTERNET4 - ATT Services, Inc.	78.57%	71.14%	8631357
AS701	UUNET - MCI dba Verizon Business	0.19%	0.06%	5359976
AS8075	MICROSOFT-CORP-MSN-AS-BLOCK - Microsoft.	0.00%	0.00%	4631978
AS20115	CHARTER-NET-HKY-NC - Charter Comms	0.10%	0.02%	3481190
AS22773	ASN-CXA-ALL-CCI-22773-RDC - Cox Comms Inc.	9.40%	8.48%	3197135
AS22394	CELLCO – Cellco DBA Verizon Wireless	89.93%	80.84%	3035397
AS20057	ATT-MOBILITY-LLC-AS20057 - ATT Mobility LLC	7.69%	7.53%	2798218
AS209	CENTURYLINK-US-LEGACY-QWEST – Qwest Co.	0.28%	0.18%	2455964
AS21928	T-MOBILE-AS21928 - T-Mobile USA, Inc.	45.39%	45.06%	2129854

Summary

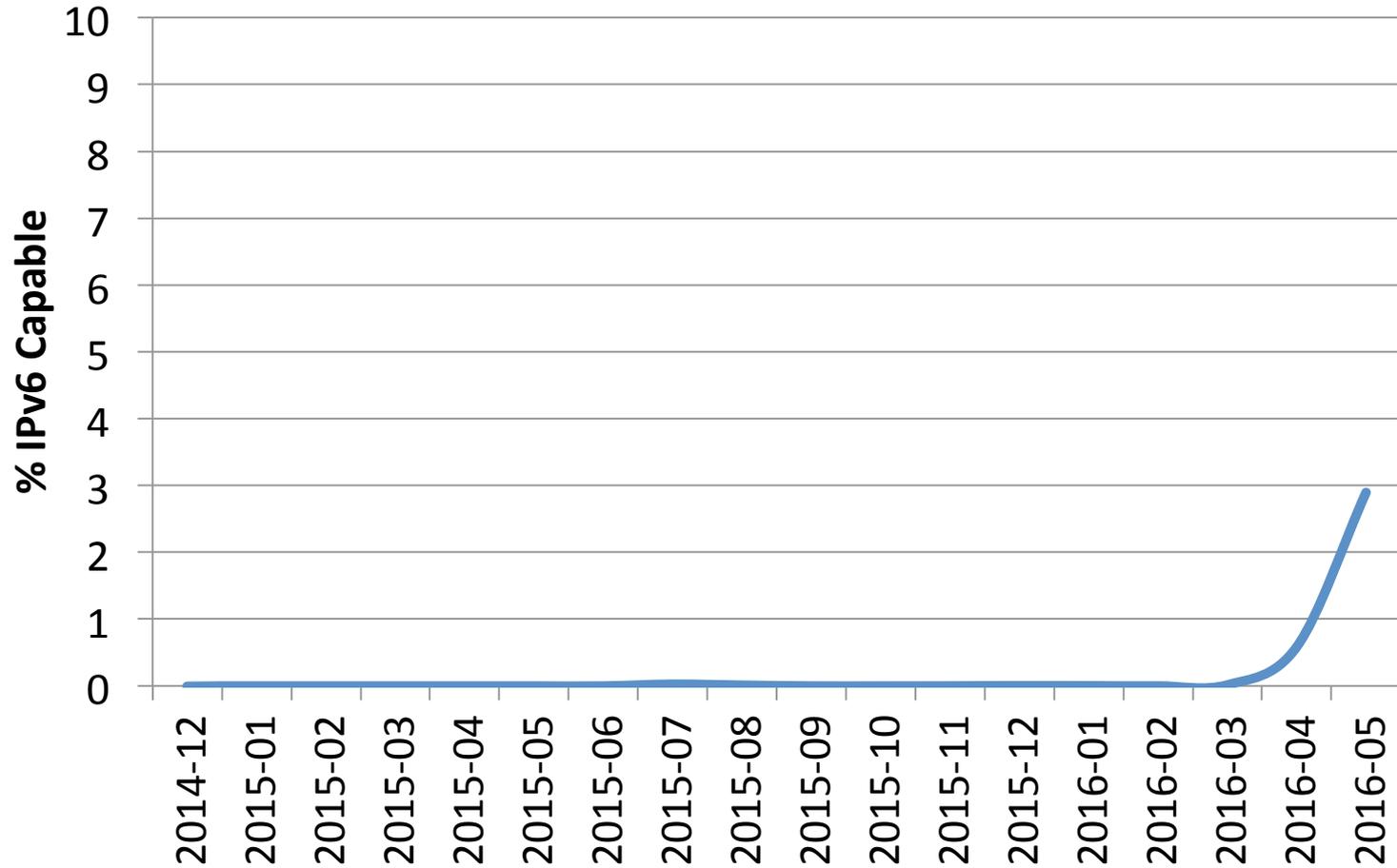
- Thailand has no shortage of ASN, IPv6
 - Thailand is now harvesting final /8 growth only in IPv4. continued buildout in IPv4 is now more painful
- Thailand has low exposure of IPv6 peering, very low visibility outside of Academic/Government of IPv6 in end users hands
- Thailand is routing packets offshore
- Its visible in public information sources.
 - You can own this, and solve this.

If we deploy IPv6 we can party on!



Pieter Bruegel the Elder: The Wedding Dance (1566)

Lets hear it for AIS Fibre AS133481!!!



If we don't deploy IPv6 it gets worse



Pieter Bruegel the Elder: The Fall of the Rebel Angels (1562)