PHNOM PENH
CAMBODIA

21 - 31 August 2012

Measuring IPv6 Users

George Michaelson,
Geoff Huston
APNIC

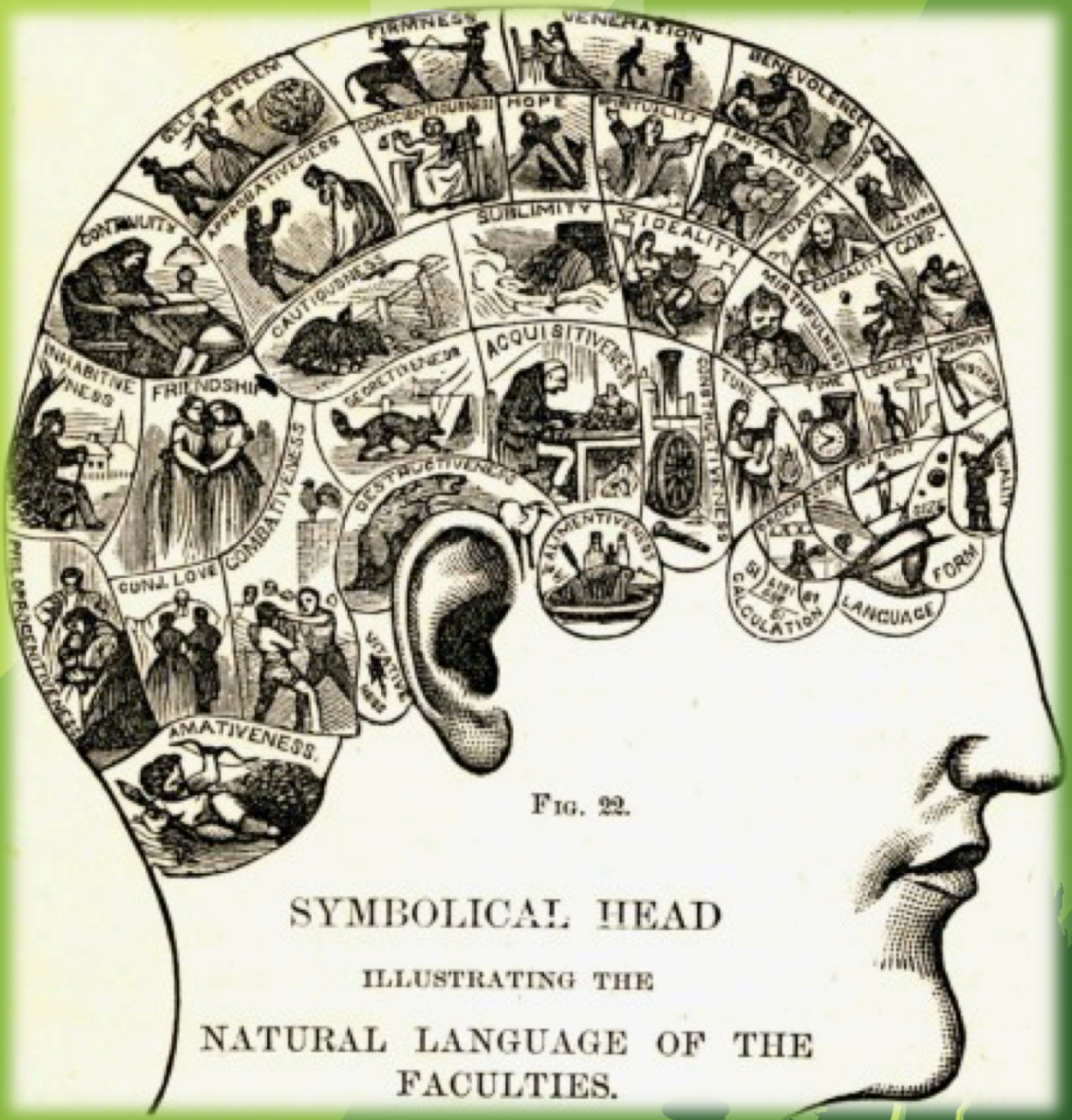


Fig. 22.

SYMBOLICAL HEAD

ILLUSTRATING THE

NATURAL LANGUAGE OF THE FACULTIES.

How to measure the end user

How to measure the end user

How to measure a million end users

How to measure a million end users

- be www.google.net

How to measure a million end users

- be www.google.net

or

How to measure a million end users

- be www.google.net

or

- Get your code run on millions of machines

Approaches to Measurement

A case study: APNIC's approach

- we wanted to measure IPv6 deployment as seen by end users
- We wanted to say something about ALL users
- Our website isn't that popular
- …So we were looking at a way to sample end users in a random but statistically significant fashion
- We stumbled across the advertising networks...

…buy the measurement

Placement

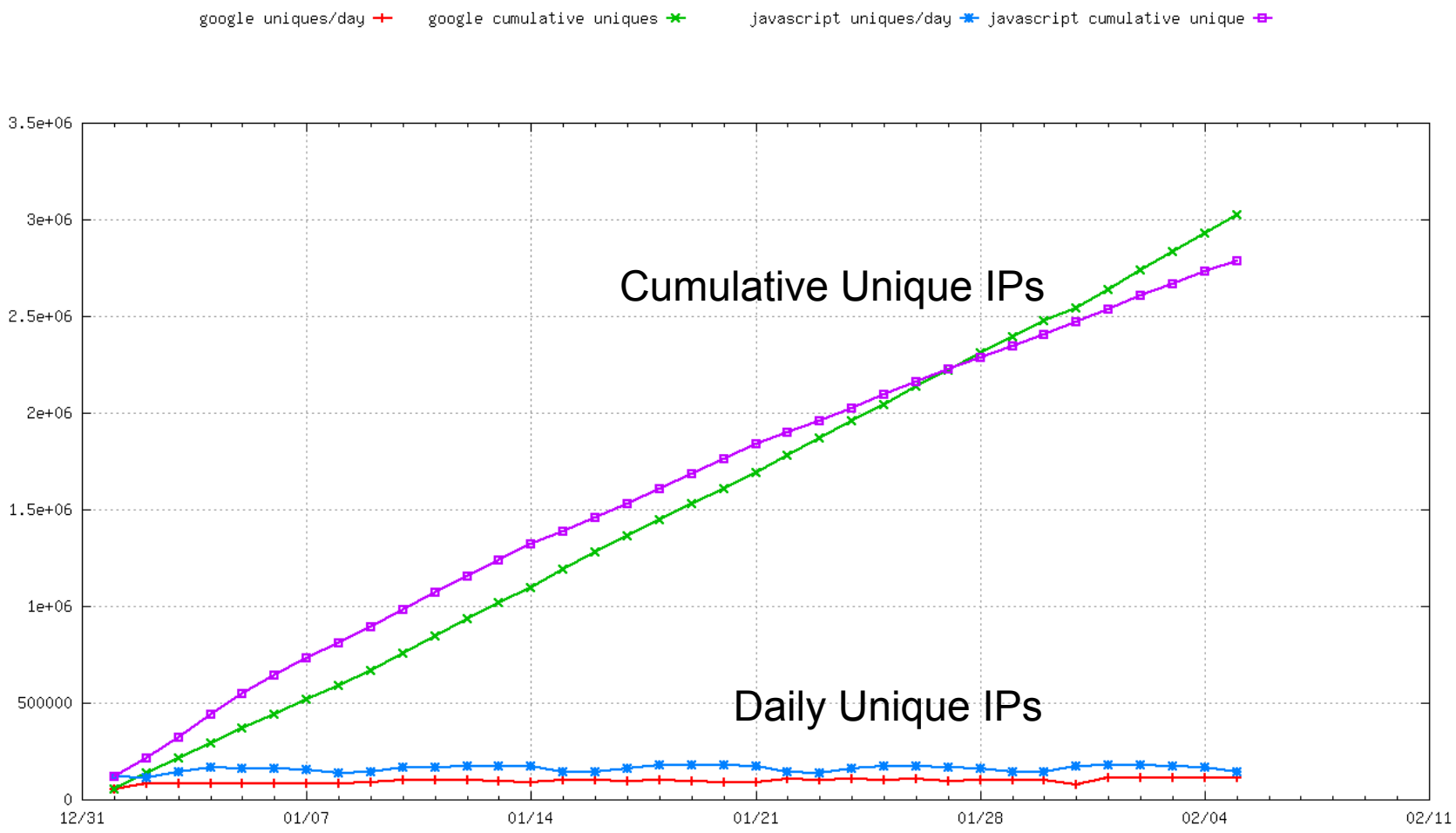
At low CPM, the advertising network needs to present unique, new eyeballs to harvest impressions and take your money.

- Therefore, a ‘good’ advertising network provides a fresh crop of unique clients per day
- Pay for placement of ads, embed the measurement in flashcode.
- Result is lots of Unique IP addresses to measure.

Unique IPS?

- Collect list of unique IP addresses seen
  - Per day
  - Since inception
- Plot to see behaviours of system
  - Do we see ‘same eyeballs’ all the time?

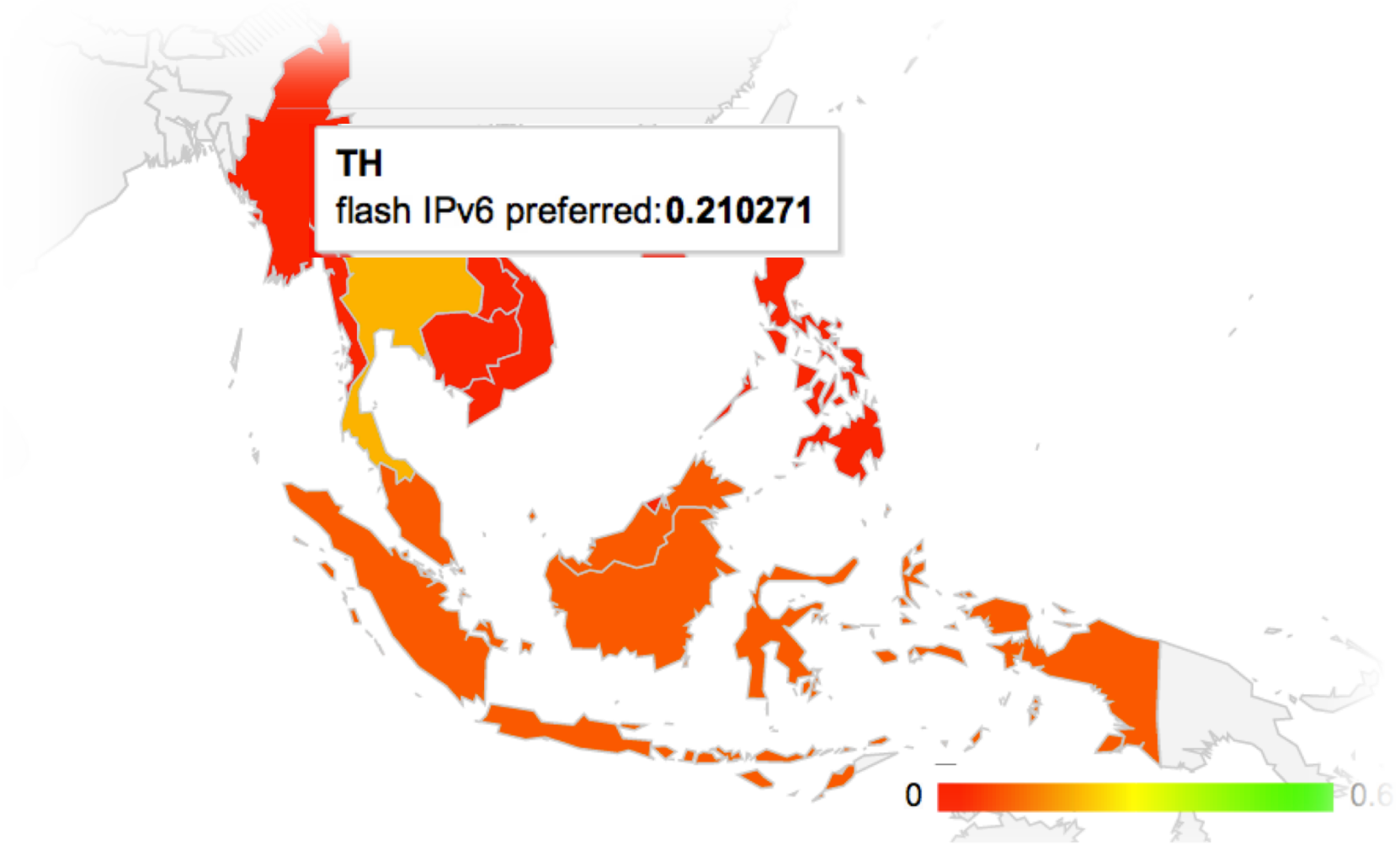
Lots of Unique IP'S



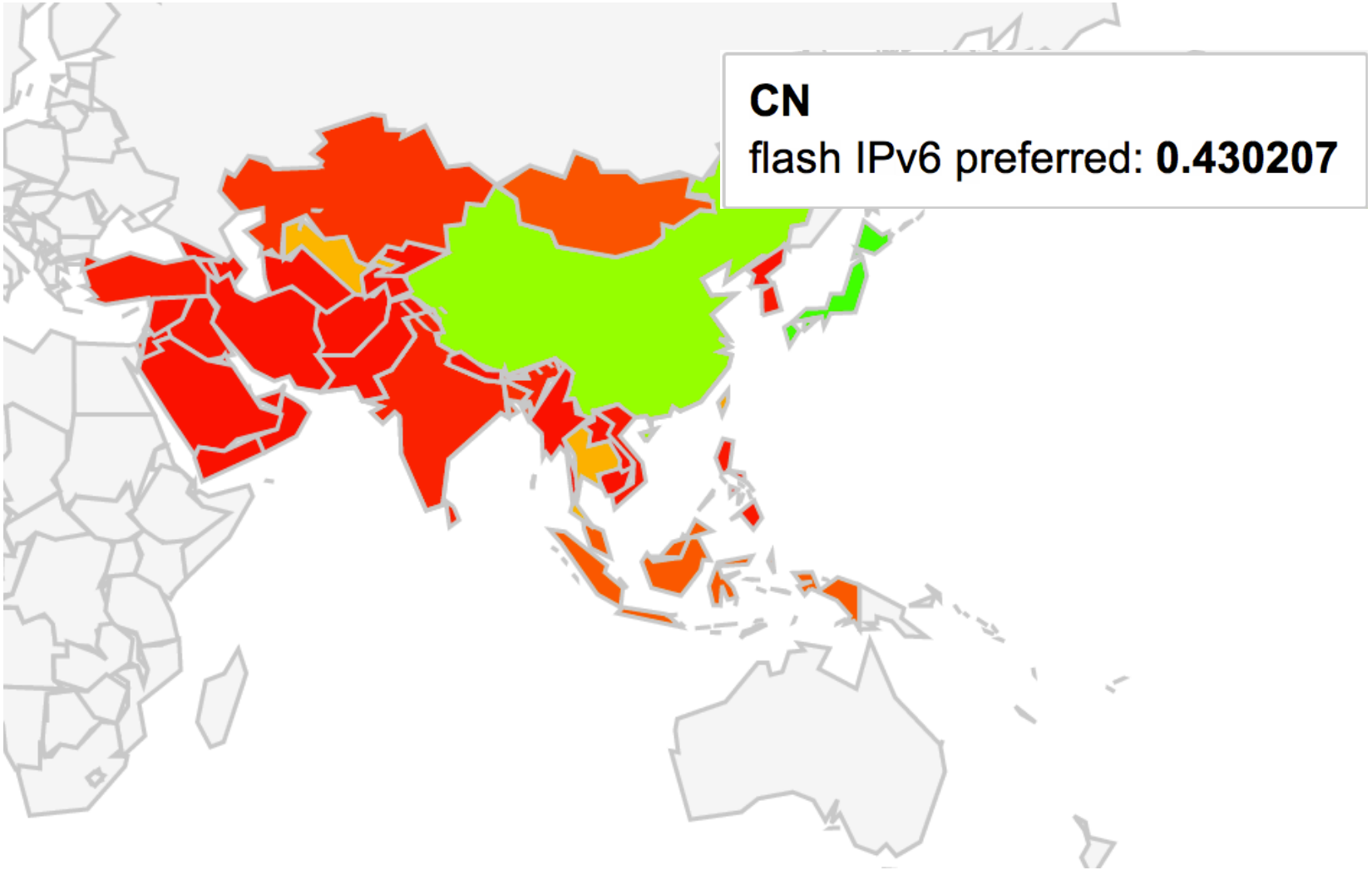
What are we finding?

- http://labs.apnic.net/ipv6_measurement
  - Breakdowns by ASN, Economy, Region, Organisation
- 125+ economies provide >200 samples/ interval consistently in weeklies
- 150+ at monthlies.
- 2400 ASN provide graphable data
- Over 35,000 ASN seen during the last year.

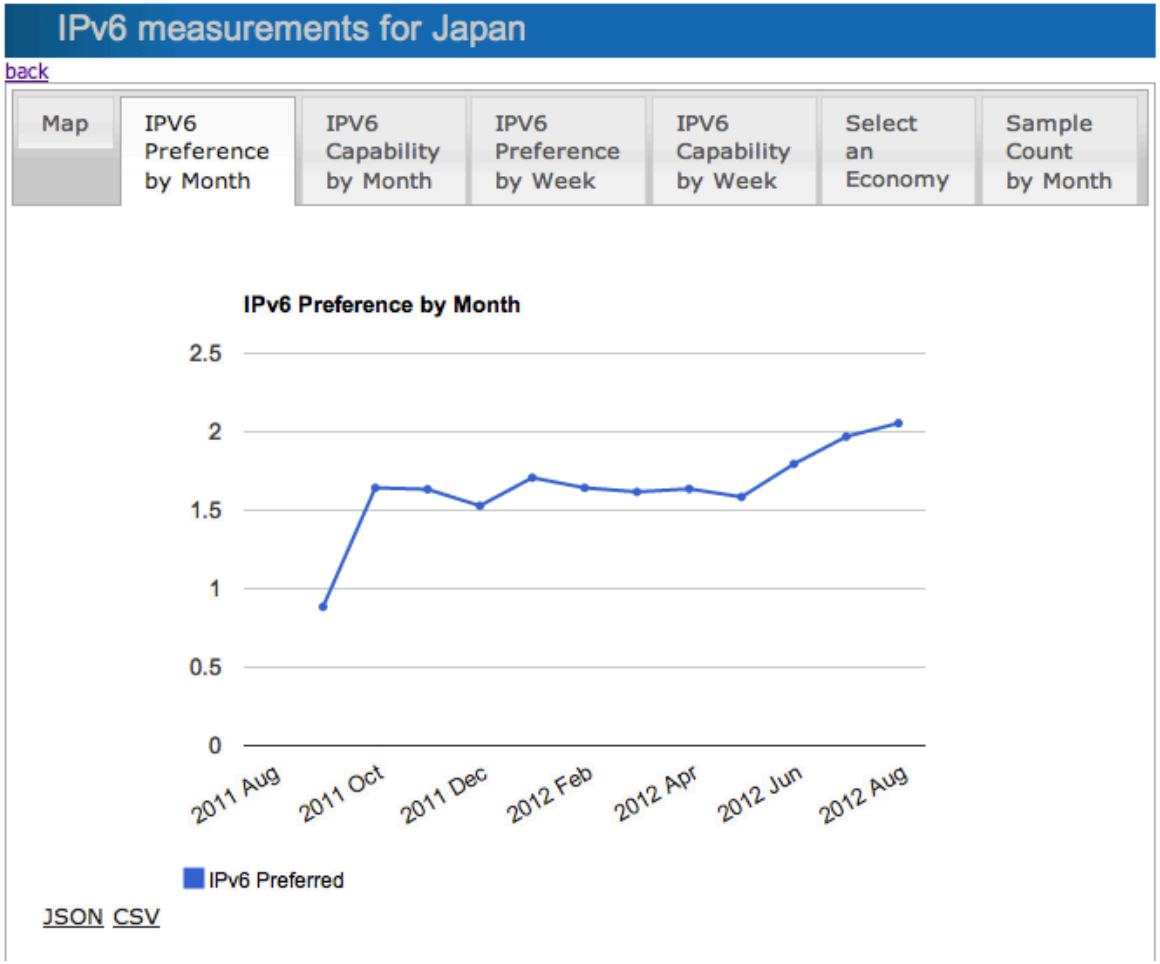
Google visualization API



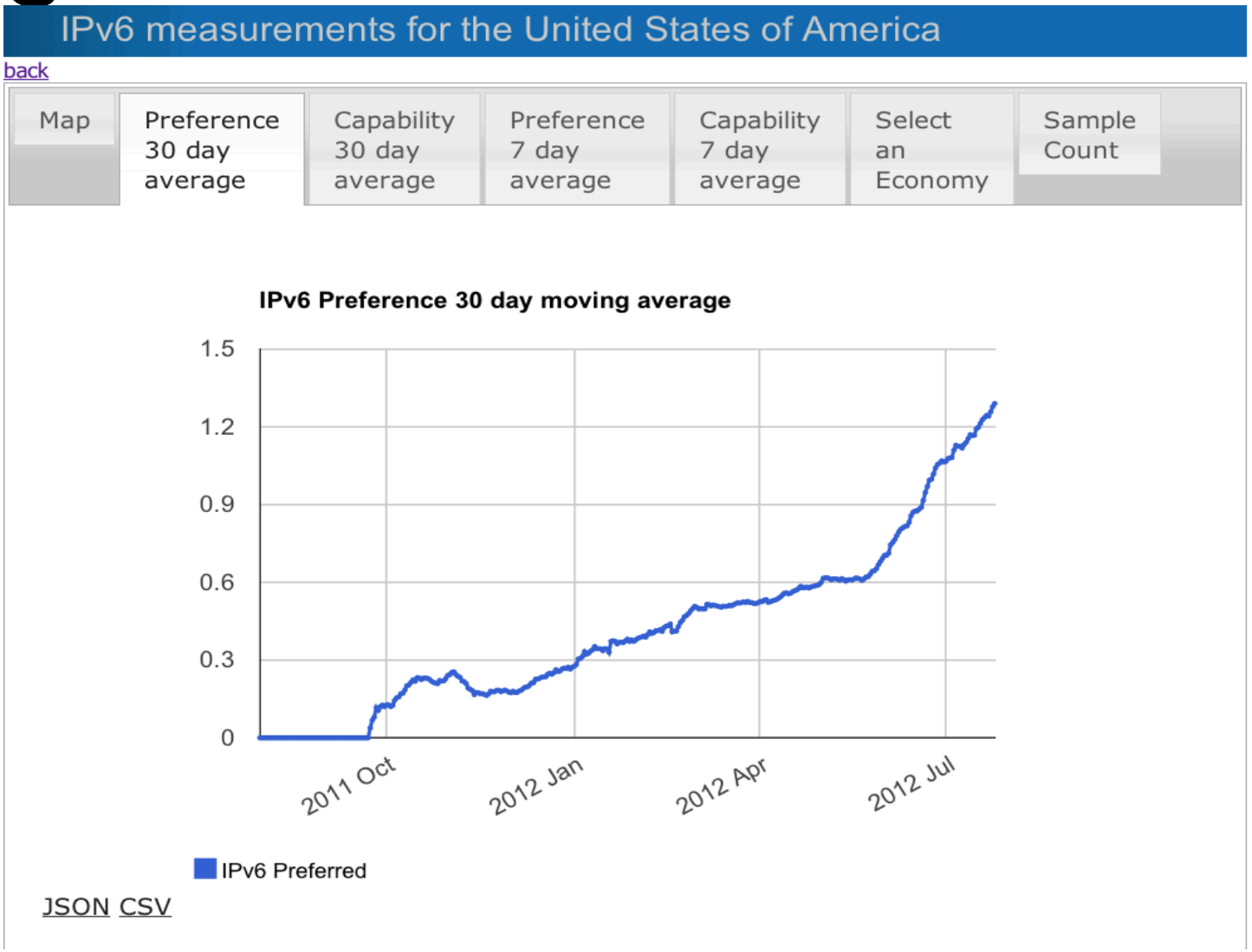
Google visualization API



Google visualization API



Google visualization API



Draw your own graphs

http://labs.apnic.net/ipv6-measurement/datafields.html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IPv6 Users by Country

Date: 28 Aug 2012

http://labs.apnic.net/dists/v6dcc.html

Index	ISO-3166 Code	Internet Users	V6 Use ratio	V6 Users (Est)	Population	Country
1	RO	8665029	9.53%	825777	22104667	Romania
2	FR	50018462	4.47%	2235825	64790754	France
3	EU	0	4.46%	0	0	European Union
4	LU	466138	3.00%	13984	509998	Luxembourg
5	JP	100917929	2.04%	2058725	126147412	Japan
6	US	247999248	1.57%	3893588	316729564	United States of America
7	CH	6449421	0.93%	59979	7659646	Switzerland
8	SK	4344641	0.81%	35191	5485659	Slovakia
9	HR	2652792	0.79%	20957	4481069	Croatia
10	NO	4577751	0.68%	31128	4709621	Norway
11	SI	1417928	0.49%	6947	1997082	Slovenia
12	NL	15147338	0.42%	63618	16924401	Netherlands
13	CN	516177549	0.42%	2167945	1344212368	China
14	CZ	7215833	0.41%	29584	10177480	Czech Republic
15	DE	67959885	0.41%	278635	82176403	Germany
16	RU	61123294	0.40%	244493	137975834	Russian Federation
17	FI	4664031	0.38%	17723	5264144	Finland
18	AU	19809183	0.36%	71313	22059224	Australia
19	MV	113898	0.36%	410	394112	Maldives
20	FO	37671	0.28%	105	49502	Faroe Islands
21	SE	8458915	0.26%	21993	9105399	Sweden
22	UZ	7619571	0.22%	16763	28431237	Uzbekistan
23	ZA	6818797	0.22%	15001	49056096	South Africa
24	TH	18430570	0.21%	38704	67264856	Thailand
25	UA	15189809	0.21%	31898	44807699	Ukraine
26	NC	80290	0.20%	160	235455	New Caledonia

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15	DE	67959885	0.41%	278635	82176403	Germany
16	RU	61123294	0.40%	244493	137975834	Russian Federation
29	GB	51852080	0.17%	88148	61655268	United Kingdom of Great Britain and Northern Ireland
18	AU	19809183	0.36%	71313	22059224	Australia
12	NL	15147338	0.42%	63618	16924401	Netherlands
36	ID	55717388	0.11%	61289	248738341	Indonesia
7	CH	6449421	0.93%	59979	7659646	Switzerland
24	TH	18430570	0.21%	38704	67264856	Thailand
62	IN	123221944	0.03%	36966	1208058281	India
32	CA	28023736	0.13%	36430	34342814	Canada
8	SK	4344641	0.81%	35191	5485659	Slovakia
25	UA	15189809	0.21%	31898	44807699	Ukraine
10	NO	4577751	0.68%	31128	4709621	Norway
28	TW	16190540	0.19%	30762	23129344	Taiwan
14	CZ	7215833	0.41%	29584	10177480	Czech Republic
63	BR	87009240	0.03%	26102	206183035	Brazil
21	SE	8458915	0.26%	21993	9105399	Sweden
9	HR	2652792	0.79%	20957	4481069	Croatia
17	FI	4664031	0.38%	17723	5264144	Finland
22	UZ	7619571	0.22%	16763	28431237	Uzbekistan
38	MY	16733270	0.10%	16733	27120373	Malaysia

http://labs.apnic.net/ipv6-measurement/W6L

IPv6 measurements for World IPv6 Event 2012

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Economy	Participant	ASNs	v6pref	3month avg hits/month	notes
TH	Kasetsart University	9411	27.04%	226	
CZ	CESNET	2852	24.35%	300	
RO	RCS & RDS	8708	22.66%	23997	
JP	KDDI	2516	18.82%	14761	
FR	Free	12322	17.14%	19192	
TH	UniNet	4621	16.43%	717	
NL	XS4ALL	3265	8.10%	1378	
US	Verizon Wireless	6167, 22394	7.69%	597	
US	ATT	6389, 7018, 7132	6.01%	18584	
LU	EPT Luxembourg	6661	5.33%	571	
GB	Janet	786	4.50%	1390	
AU	Internode	4739	3.57%	492	
US	Comcast-all	7015, 7016, 7725, 7922, 11025, 13367, 13385, 20214, 21508, 22258, 33287, 33489, 33490, 33491, 33650, 33651, 33652,	1.63%	26035	

IPv6 measurement

- Penetration rate of IPv6 into the global AS economy is slowly rising.
- Signs Global-Unicast IPv6 will shortly overtake Teredo
- Widely distributed hop-over for IPv6 being seen.
  - due to the CPE gap ?
  - Even IPv6 enabled ISPs have customers tunnelling over the air-gap
- Much more information about IPv6, global internet behaviour is in the data
  - “watch this space” –long-term investment in measurement, ongoing.
  - Better datasets, BigTable map/reduce
  - Collaborations with “the usual suspects” to extend the experiment

IPv6 measurement

If you see the advert

IPv6 measurement

If you see the advert

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(it costs us more)

A word for our sponsors

- Thanks to
  - the Internet Society
  - Google
  - ISC
  - RIPE NCC

- For funding, platform support, collaboration