RIPE NCC
RIPE NETWORK COORDINATION CENTRE

The State of the (Danish) Internet
-
Interpreting RIPE NCC Data and Measurements

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Overview

- RIPE Atlas
  - How it works & use cases
  - The IXP country jedi: measurements in Denmark
- RIPE Labs
  - Content for operators
  - Statistics
- IPv6 deployment in Denmark

RIPE NCC Background

- Established in 1992 by the RIPE community
- Funded by membership
  - 13,000 members, 76-country service region
- One of five Regional Internet Registries

RIPE NCC Services

- Member Services
  - Resource distribution (IPv4, IPv6, ASNs)
  - Resource certification
  - Training
  - LIR Portal features
  - Extra features in RIPE Atlas
- Public Services
  - RIPE Database
  - Reverse DNS
  - Operating K-root server
  - Operator tools
    - RIPE Atlas, RIPEstat, RIS, RIPE Labs
  - Data sharing, Statistics
  - Open meetings

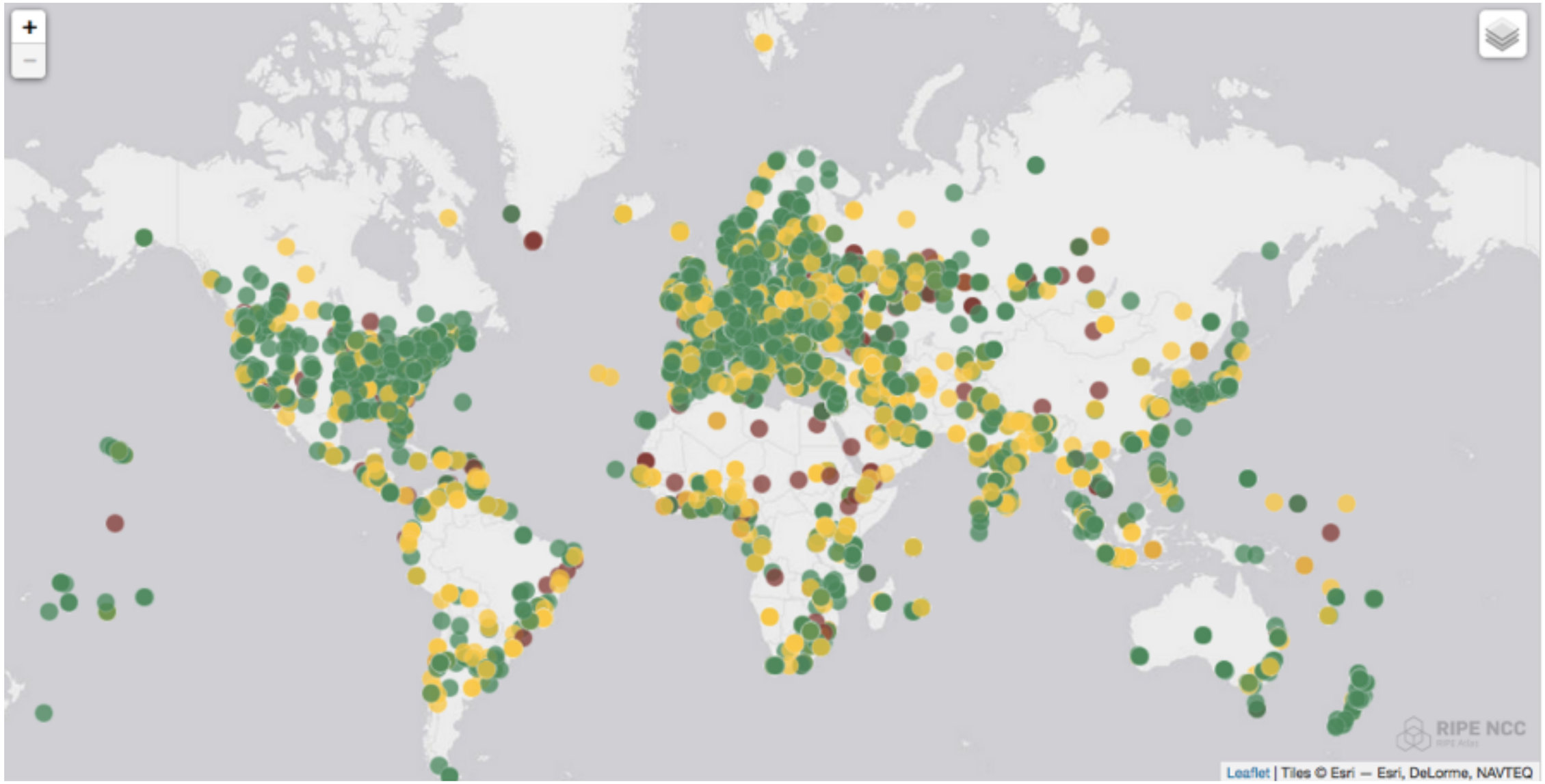
RIPE Atlas

Active Measurements Network

- Largest active measurements network
- Thousands of measurement nodes
- Probes run different measurements
  - ping, traceroute, DNS, SSLcert

https://atlas.ripe.net

RIPE Atlas Coverage

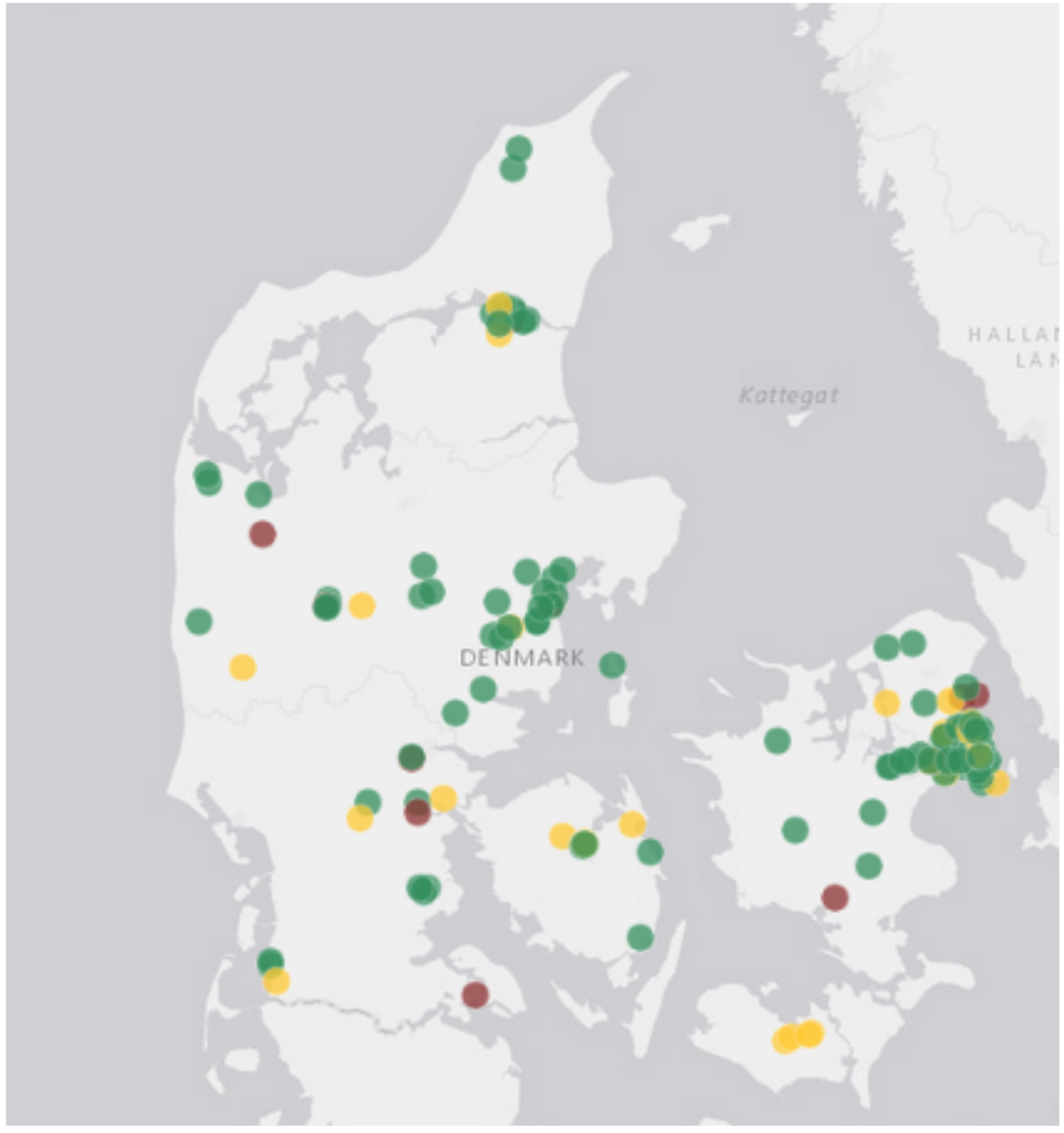


Connected: 9278 Disconnected: 3548 Abandoned: 1635

RIPE Atlas Probes & Anchors in DK

Three RIPE Atlas Anchors

dk-blp-as197495	6109	Larsen Data ApS
dk-blp-as39839	6103	DK Hostmaster A/S
dk-blp-as59469	6069	Solido Networks ApS



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 - Methodology

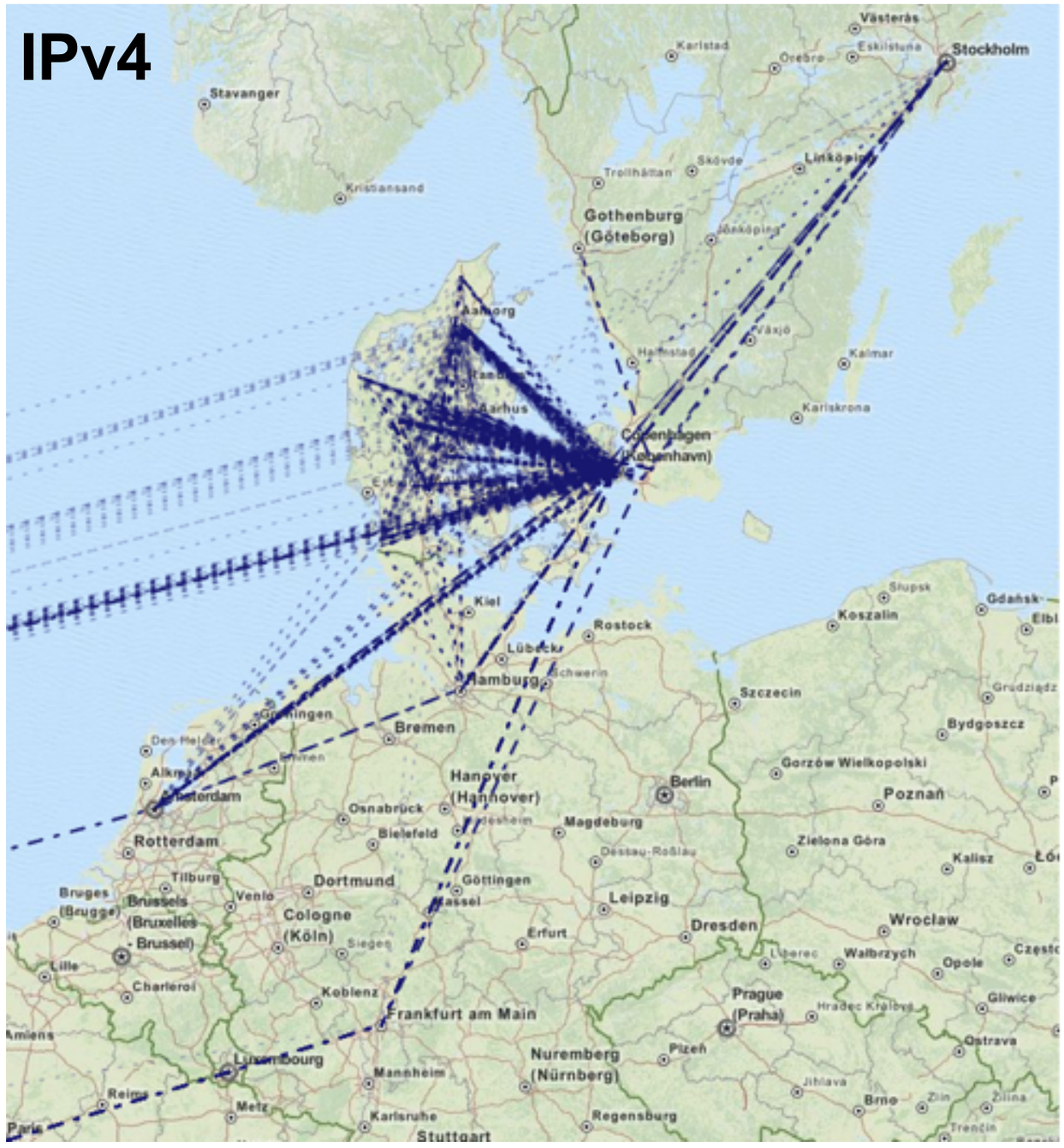
- traceroute mesh between RIPE Atlas probes
  - Identify ASNs in the country using RIPEstat
  - Identify IXPs & IXP LANs using PeeringDB
  - Mesh: from a set of probes in a country to each other
  - Max 2 probes per ASN
  - Only “public” probes with “good” geolocation
  - Hops geolocated using “OpenIPMap” database

Do Paths Stay in the Country?

- Snapshot of the paths that do, or don't, stay local

Difference between IPv4 & IPv6

- Fewer RIPE Atlas probes support IPv6



How Many Paths Go Via Local IXP?

IXP IPs: Yes
Out of country IPs: No

IXP IPs: No
Out of country IPs: No

IXP IPs: Yes
Out of country IPs: Yes

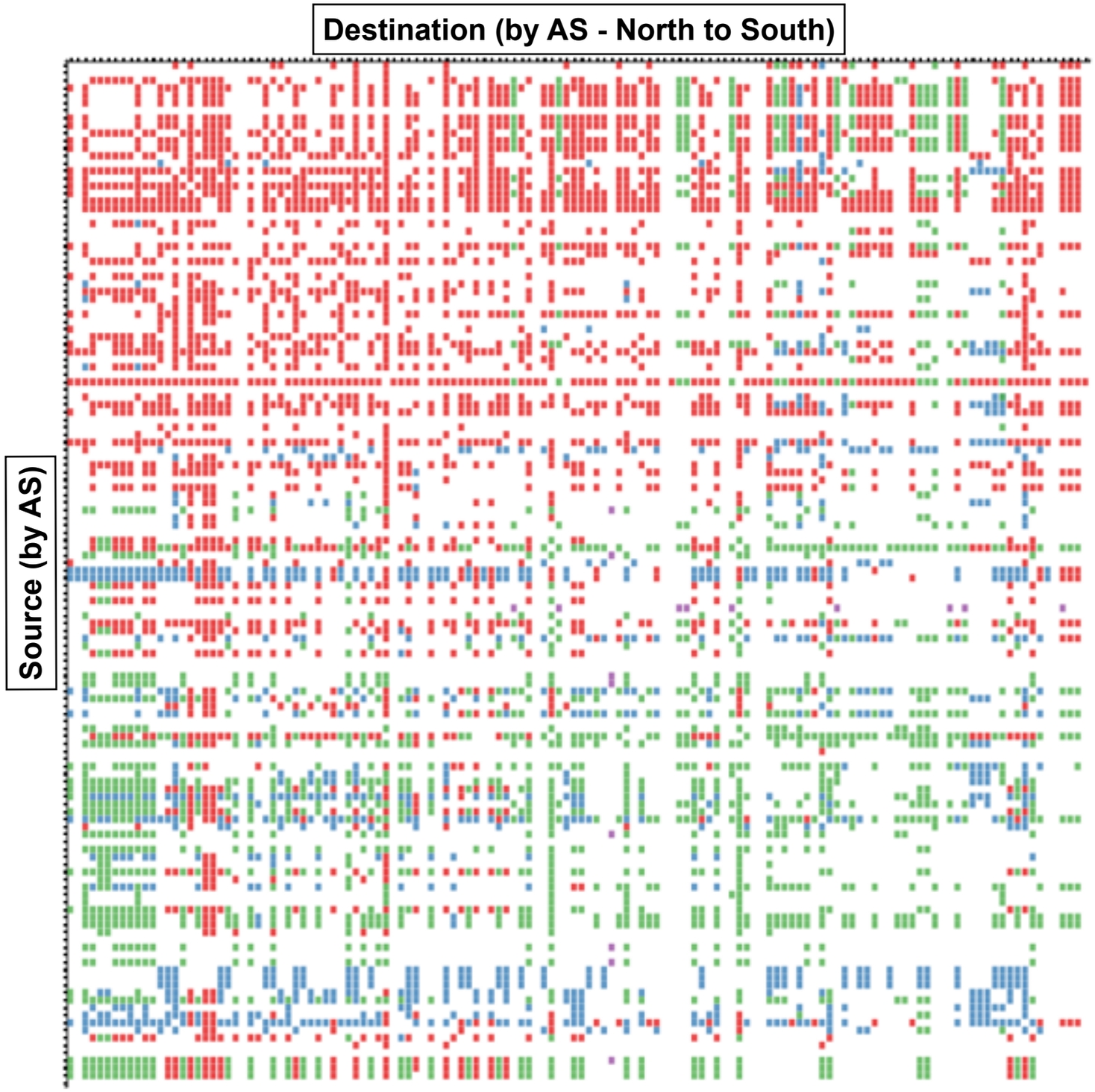
IXP IPs: No
Out of country IPs: Yes

What if we look at DK & SE?

Netnod Stockholm

COMIX

Danish IXP (DIX)



Improving RIPE Atlas in DK

- 41 ASes are used in the country jedi
  - there are 235 ASes in DK
- Set your probe to ‘public’ and check geoloc
  - that means your IP address is public

Actions

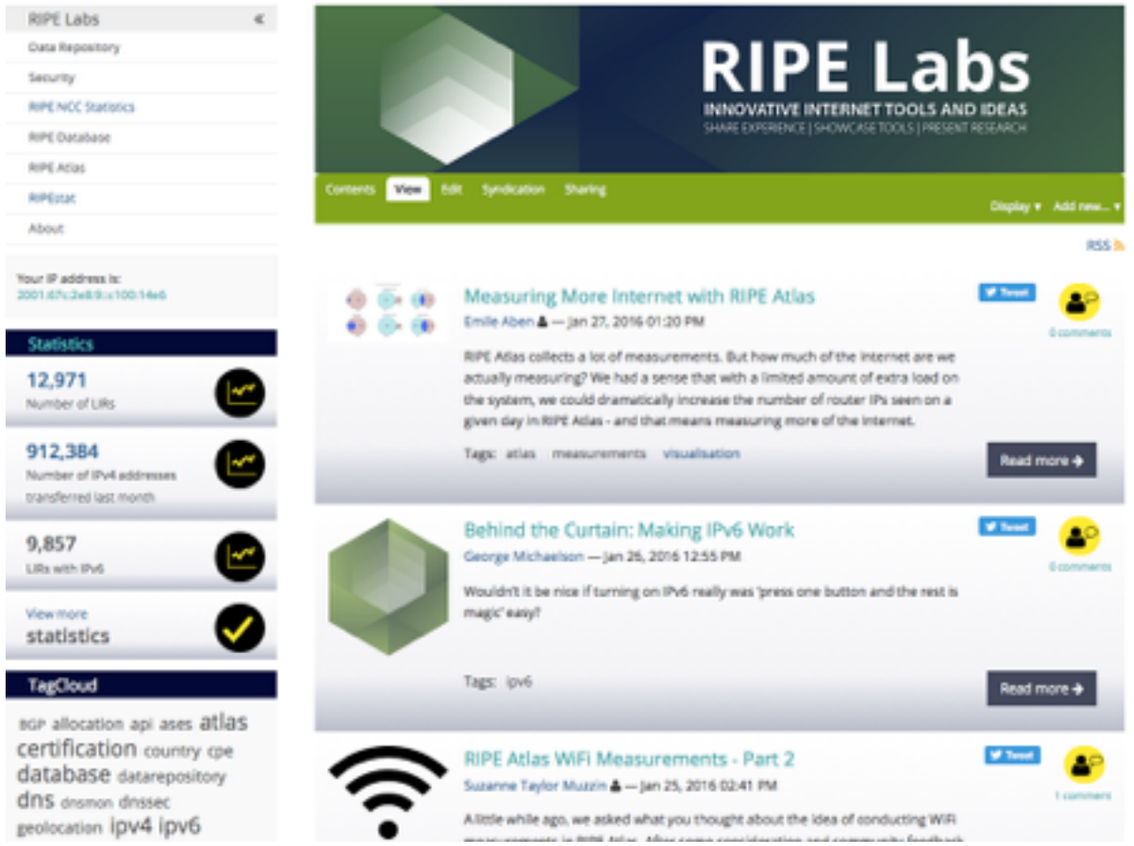
- Use this tool to find possible suboptimal routing
- Improve accuracy of this diagnostic tool
  - If your ASN is not on the graph, **apply for a RIPE Atlas probe**
  - If you move, remember to update your probe's geolocation
- Use and improve open source software
- Improve infrastructure geolocation: contribute data to OpenIPMap!

http://sg-pub.ripe.net/emile/ixp-country-jedi/latest/DK/

RIPE Labs

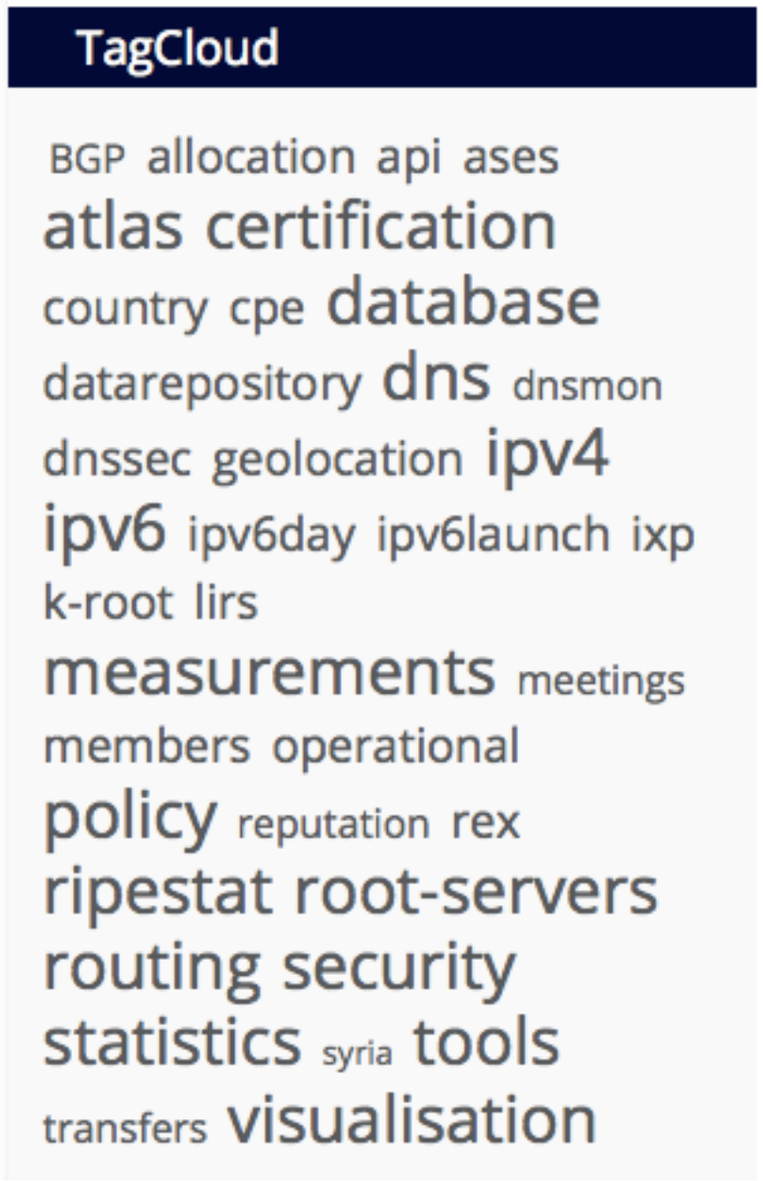
https://labs.ripe.net

- Community platform:
  - Test and evaluate new tools and prototypes
  - Contribute new ideas and research results
  - Provide feedback and discuss with others
- We want your input!



RIPE Labs Content

- Statistics and measurements
  - Routing, IPv4, IPv6, DNS, traffic
- Tools
  - RIPE Atlas, RIPEstat, RIPE DB
- Research and analysis



RIPE Labs Statistics Dashboard

Tags

allocation ases atlas
certification country
database ipv4 ipv6
k-root lirs meetings
ripestat routing syria
transfers

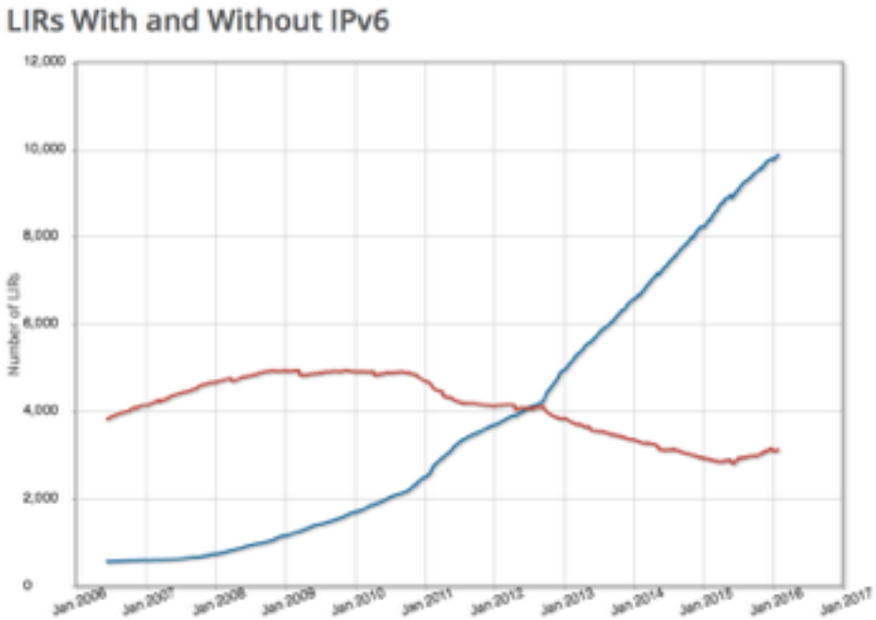
Statistics

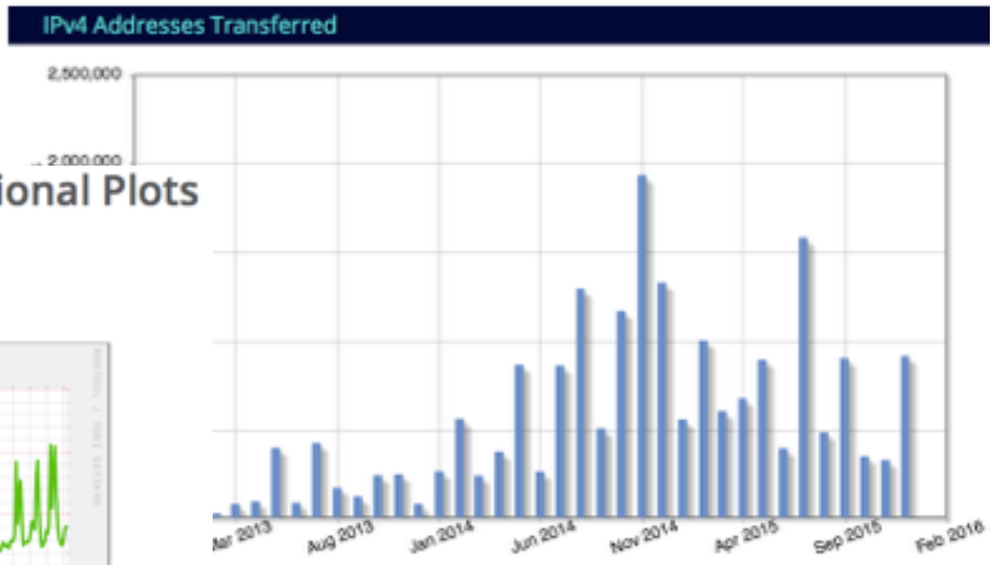
12,971
Number of LIRs

912,384
Number of IPv4 addresses transferred last month

9,857
LIRs with IPv6

View more
statistics

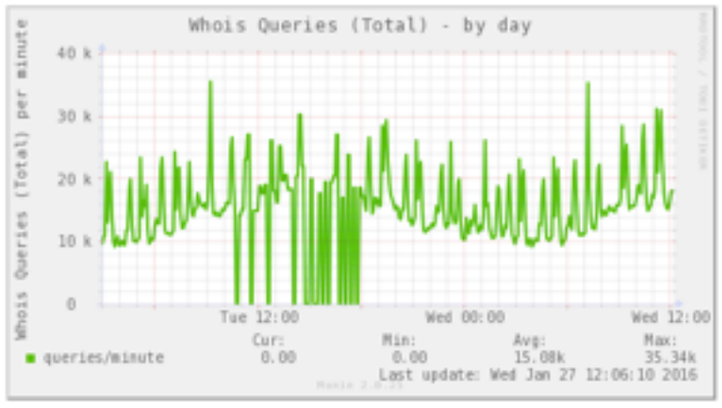




RIPE Database Server - Operational Plots

Query rate:

The number of RIPE Database queries we serve in total



Contribute to RIPE Labs

- Working on interesting research?
- Found useful analysis?
- Developed cool operators tool?
- Publish it on RIPE Labs!

https://labs.ripe.net

RIPE NCC

RIPE NETWORK COORDINATION CENTRE

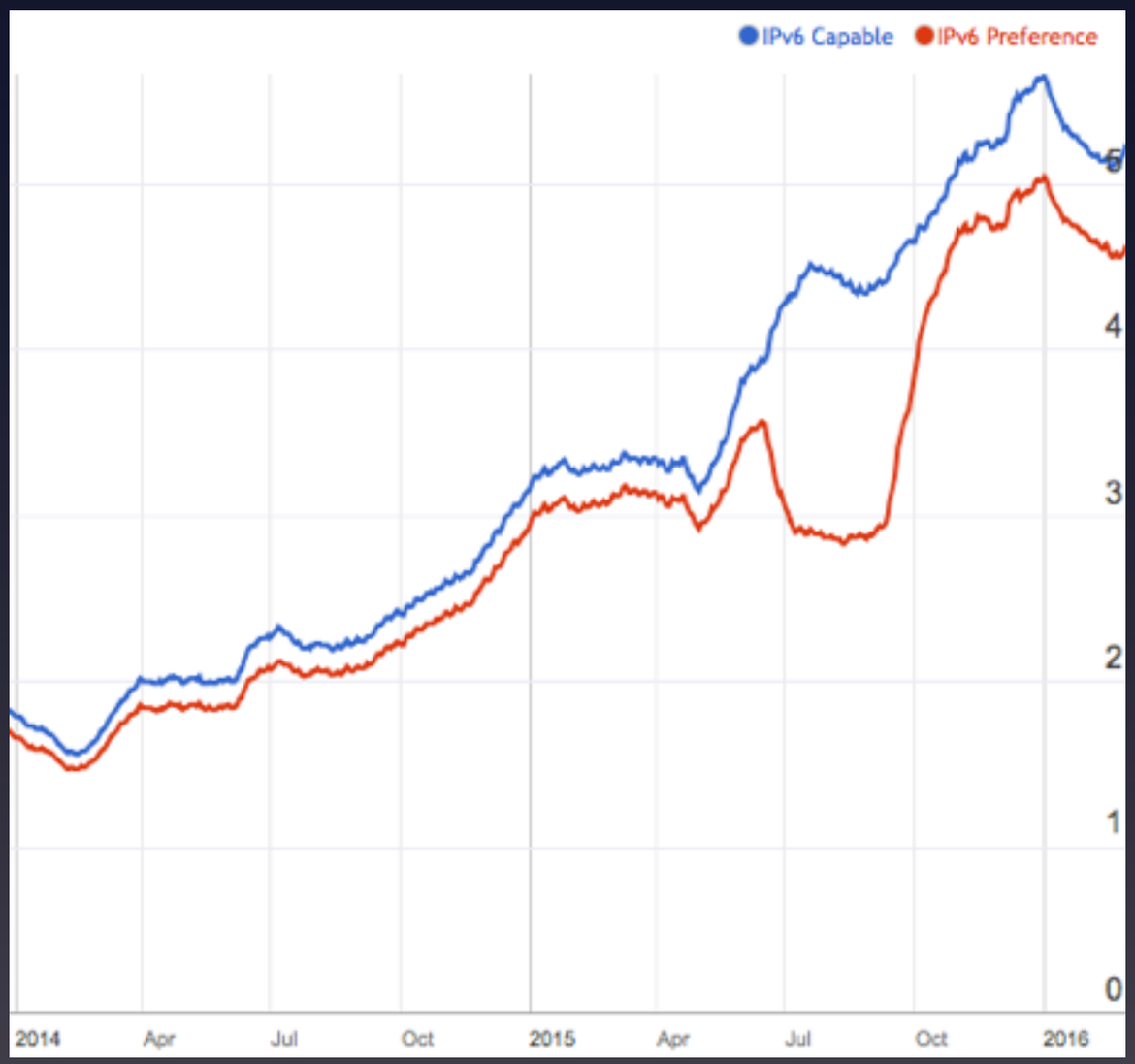
IPv6 in Denmark

What is happening?

Marco Hogewoning | March 2016

IPv6 Is On The Rise

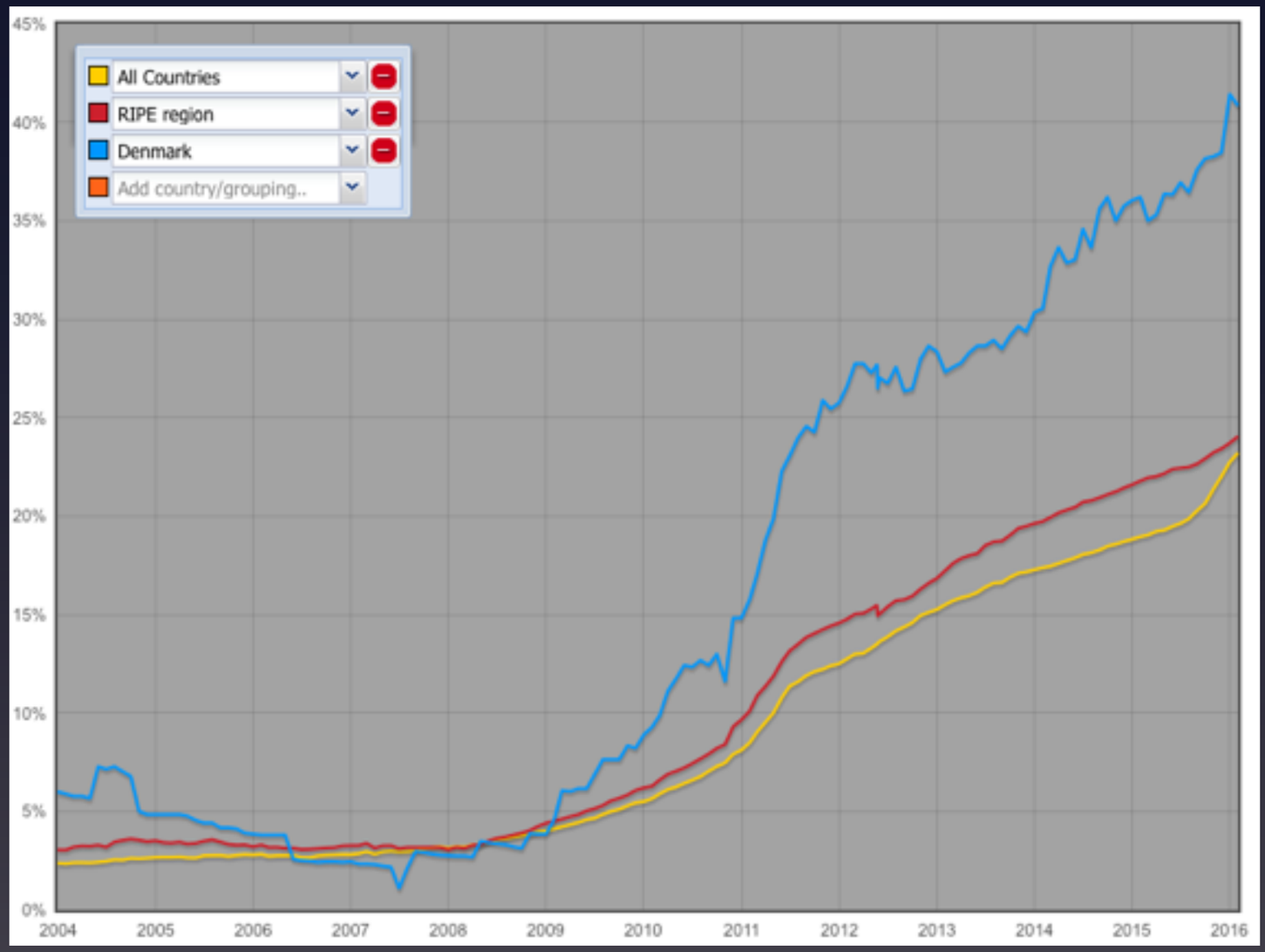
- APNIC measures 5% IPv6 capable users
- Google reports 10% global IPv6 use
- Everybody talks about it



Globally observed IPv6 usage (source APNIC)

RIPE NCC Measurements Confirm

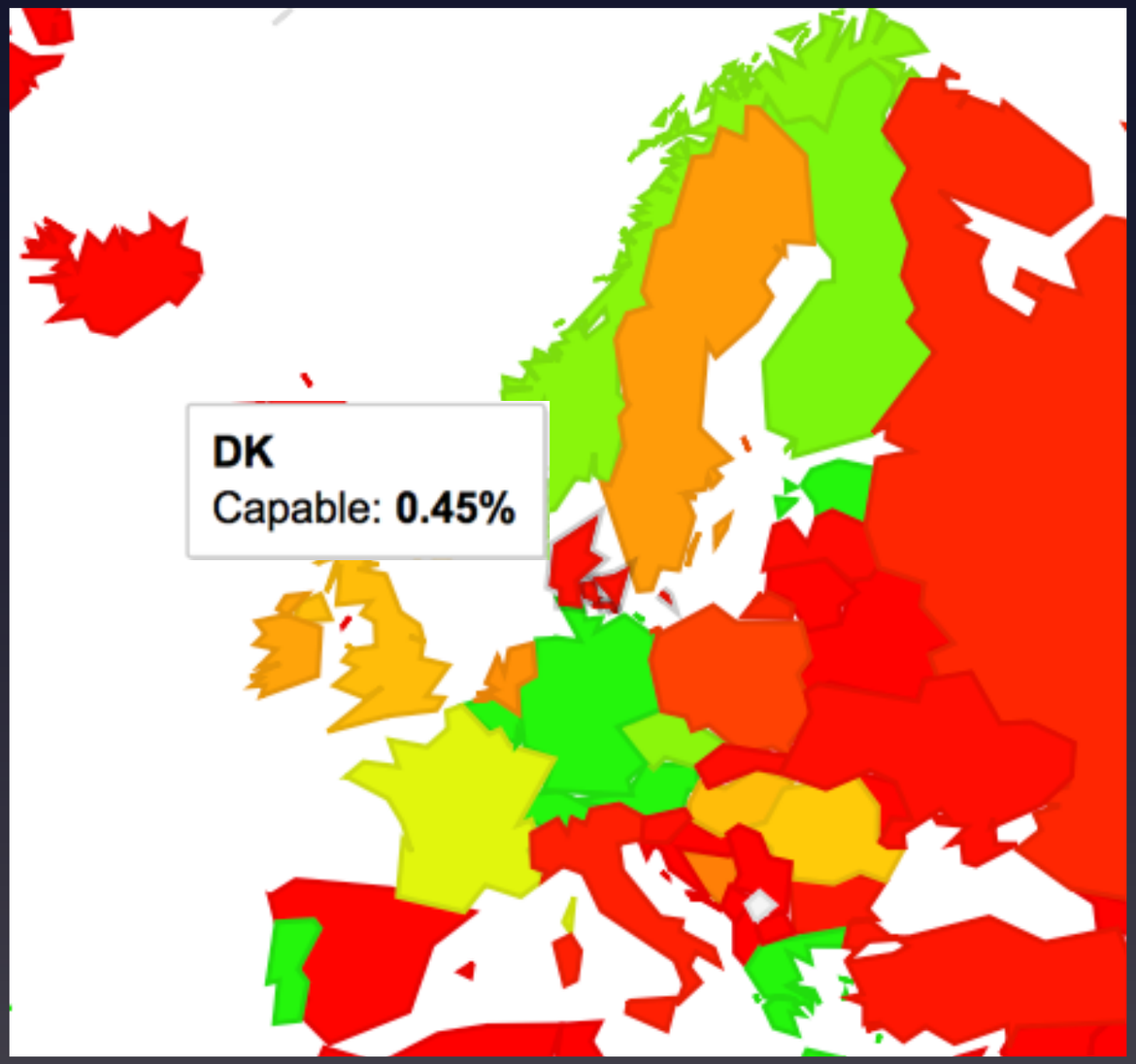
- ASNs advertising IPv6 goes up
- Over 10.000 members have IPv6 allocation
- IPv6 RIPEness for Denmark shows 80% has IPv6 addresses



This graph shows the percentage of networks (ASes) that announce an IPv6 prefix for a specified list of countries or groups of countries (http://http://v6asns.ripe.net)

IPv6 in Europe

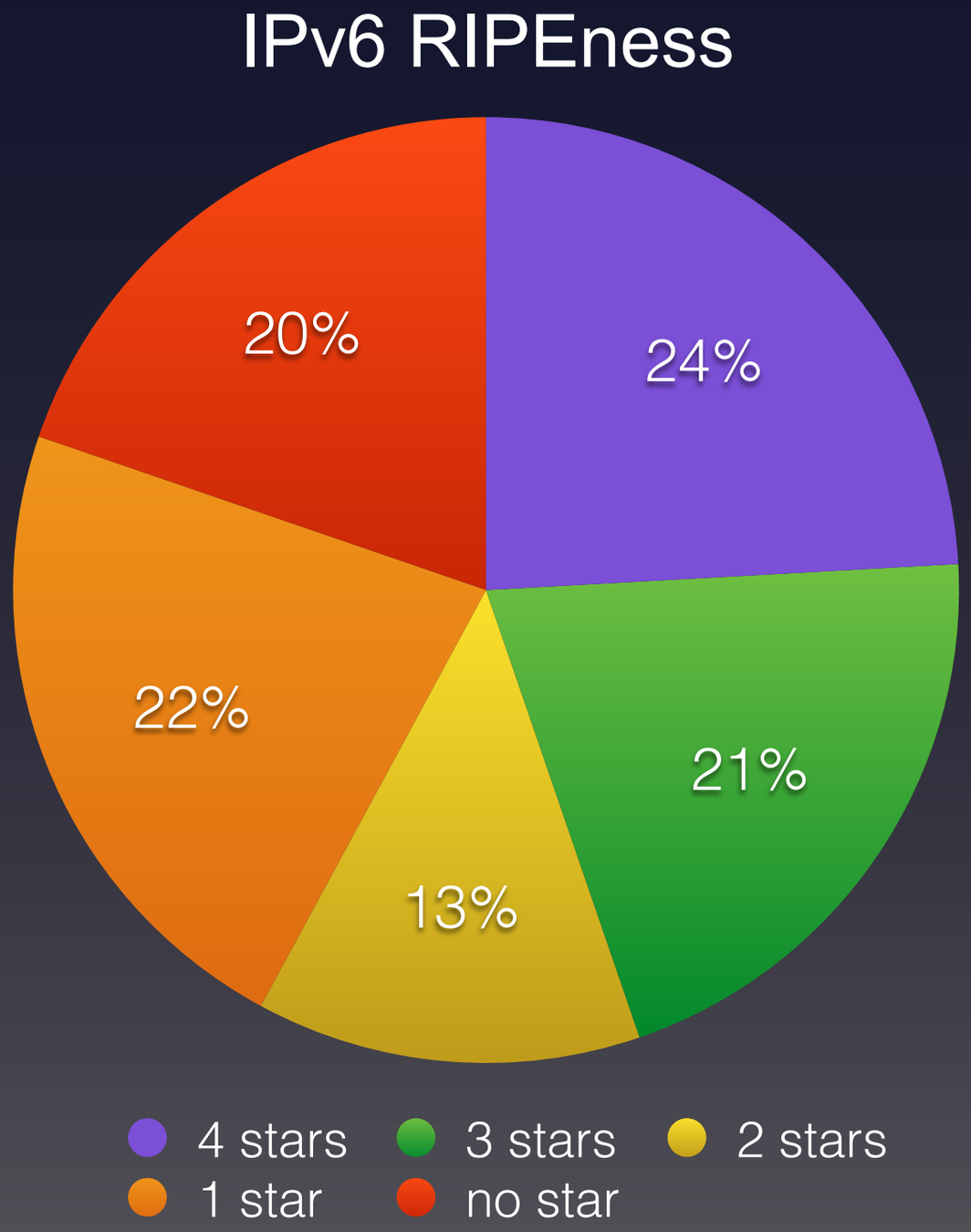
- Belgium 49%
- Switzerland 29%
- Portugal 28%
- Greece 25%
- Germany 18%
- Finland 12%
- Norway 12%



IPv6 usage per country (source APNIC)

IPv6 in Denmark

- 230 members
  - 80% has IPv6
- 239 ASNs
  - 99 originate IPv6
- “5th star”
  - Content: 1,3%
  - Access: 4,3%



What is Happening?

Danish Internet Market

- 5,7 million people
- 2,3 million fixed broadband (June 2015)
- 6,3 million wireless broadband (June 2015)
- 1,3 million .dk domains (February 2016)

Source: OECD and DK Hostmaster

Who Is Doing IPv6?

AS60876	Gigabit	75,3%
AS12617	Solido Hosting	45,8%
AS203953	Hiper	18,3%
AS1835	FSKNET	9,7%
AS21060	Atea	8,3%
AS49010	Herning Kommune	4,4%
AS57860	Zencurity	3,9%
AS51430	AltusHost BV (NL?)	3,8%
AS42236	IT-afdelingen	3,6%
AS46805	CachedNet LLC	1,4%
AS42525	GlobalConnect	1,1%
AS29695	Altibox	1,1%
AS3308	TeliaSonera DK	0,7%

Source: APNIC

How Much IPv6 Is That?

			Samples
AS60876	Gigabit	75,3%	2487
AS12617	Solido Hosting	45,8%	321
AS203953	Hiper	18,3%	115
AS1835	FSKNET	9,7%	13093
AS21060	Atea	8,3%	203
AS49010	Herning Kommune	4,4%	2759
AS57860	Zencurity	3,9%	279
AS51430	AltusHost BV (NL?)	3,8%	183
AS42236	IT-afdelingen	3,6%	83
AS46805	CachedNet LLC	1,4%	1187
AS42525	GlobalConnect	1,1%	15896
AS29695	Altibox	1,1%	10696
AS3308	TeliaSonera DK	0,7%	143475

Source: APNIC

Size matters!

Where Are the Customers?

		Samples	% of samples	**IPv6?**
AS3292	TDC	705218	43,5%	0,01%
AS3308	TeliaSonera DK	143475	8,9%	0,70%
AS9158	Telenor	128676	7,9%	0,00%
AS197288	Stofa	97535	6,0%	0,01%
AS16245	Netgroup	92251	5,7%	0,01%
AS44034	Hi3G	90564	5,6%	0,00%
AS42335	BredBaand Nord	58760	3,6%	0,00%
AS39642	Stofa	55987	3,5%	0,01%
AS15516	Arrowhead	53987	3,3%	0,01%
AS35376	TRE-FOR	51511	3,2%	0,01%
AS43557	EnergiMidt	40506	2,5%	0,00%
AS44869	Fibia	27977	1,7%	0,02%
AS31027	Nianet	26951	1,7%	0,39%

AS49010	Herning Kommune	2759	0,17%	4,35%
AS60876	Gigabit	2487	0,15%	75,27%

Source: APNIC

Think Big!

- IPv6 needs to gain momentum
  - Peer pressure helps (“keeping up with the Joneses”)
  - Networking effect increases value
- Market appears competitive
  - Observe many equal sized networks
  - IPv6 can become your Unique Selling Point
  - A lot of networks show tiny bits of IPv6, pilots?
- You can make a difference

What is the next step?

Meet Us at RIPE 72 in Copenhagen

RIPE 72
23 - 27 May 2016
Copenhagen, Denmark

RIPE Atlas Hackathon

- 2015: DataViz & Operator tools
- 21 - 22 May 2016, Copenhagen
  - **Hacking interfaces**
  - Weekend before RIPE 72
  - Application form
  - More on RIPE Labs
- 22 - 23 October 2016, Madrid
  - **IXP tools**

How can we help

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