

# Status of IPv6

ISOC - Annual General Assembly 2014

April 4, 2014, Bern



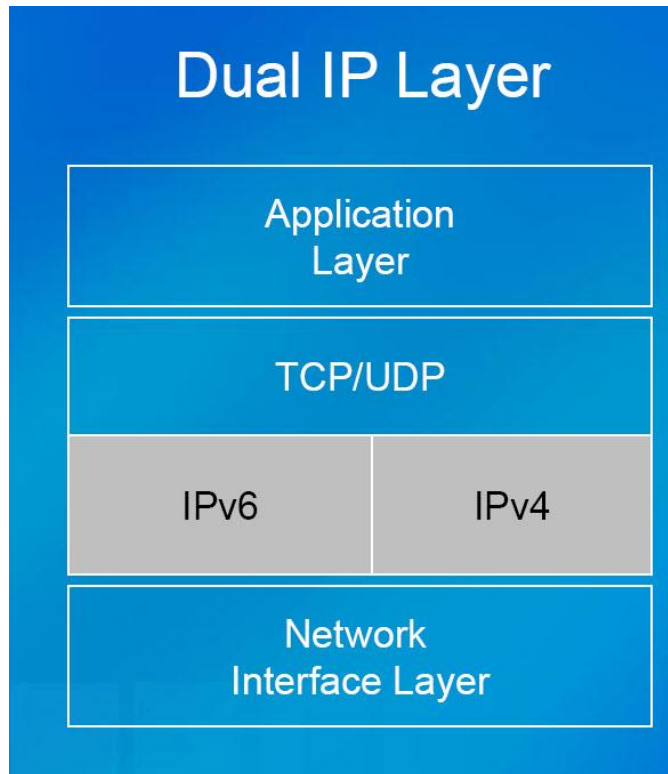
# Taking Off



June 8, 2011



# What is IPv6?



## The highway for the Future Internet

### Features:

- More address space, 32 vs. 128 bit  
IPv4: 192.168.0.1  
IPv6: 2001:db8:2:45:3578:1234:9765:5
- New address architecture (multiple addresses per interface)
- Optimized routing, fixed length IP header
- Extension headers for options
- Foundation for new services

# Bob Kahn



The Swiss IPv6 Council received the Jim Bound Award for IPv6 World Leadership in 2013 by the International IPv6 Forum on March 19 at the V6 World Congress in Paris.

The Award was presented by Bob Kahn, Internet Pioneer, father of TCP/IP and founding member of ISOC.

# Swiss IPv6 Council receives Award

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Latif Ladid, President of the International IPv6 Forum:

“Switzerland under the decade-long leadership of Silvia Hagen has achieved the first double digit v6 penetration in 2013, demonstrating that v6 deployment is achievable if you get the major stakeholders to move together in this gigantic worldwide effort. Switzerland has broken the ice for the rest of the world and got the race for double digits as the new milestone for the other countries to achieve. Switzerland became the model country to emulate. This was in itself a strategic tipping point for a re-fresh deployment effort after years of stagnation. The Jim Bound Award will be the piece of recognition to get in this new v6 inflection point.”

# Jim Bound Award





## IPv6 Adoption

We are continuously measuring the availability of IPv6 connectivity among Google users. The graph shows the percentage of users that access Google over IPv6.



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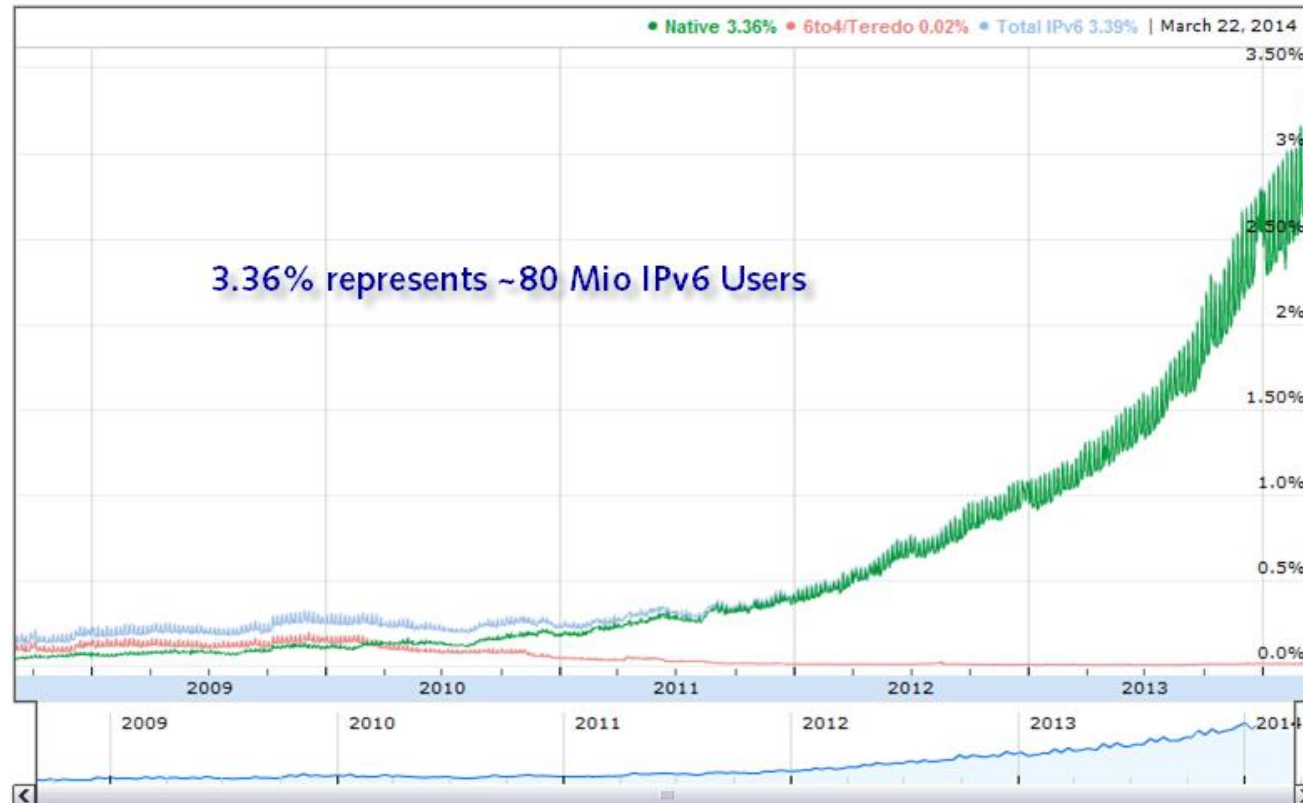




# March 2014

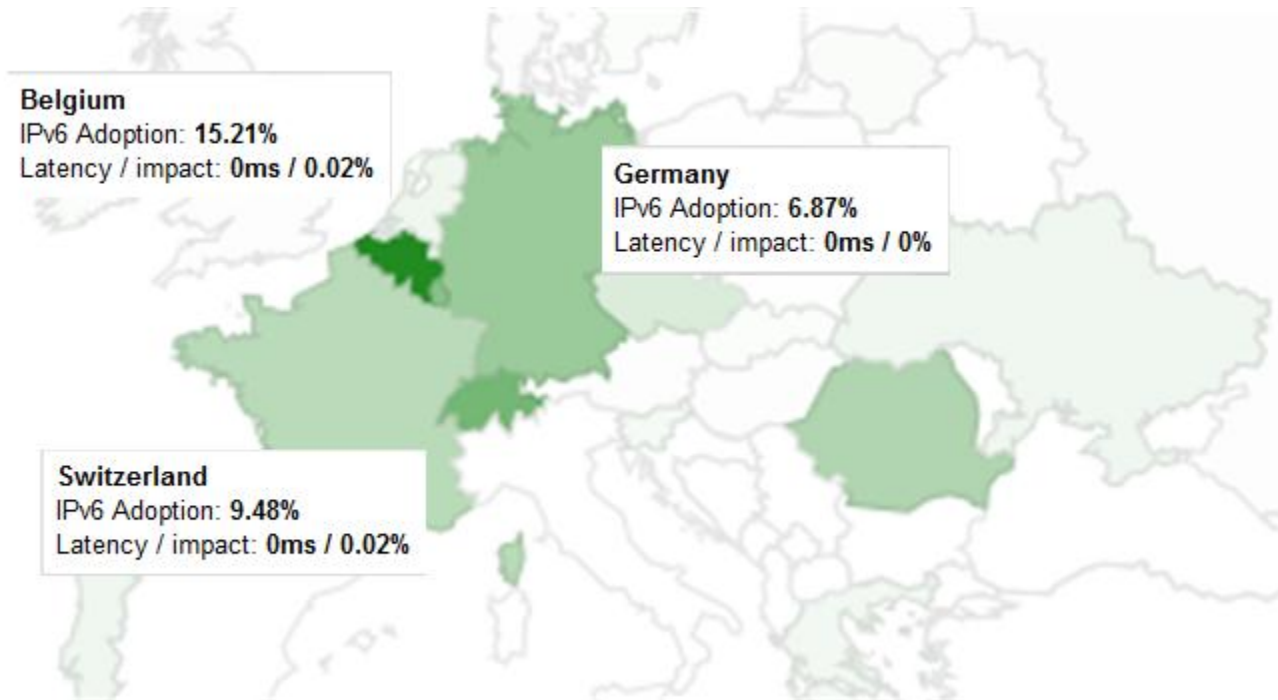
## IPv6 Adoption

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<http://www.google.com/intl/en/ipv6/statistics.html>

# Google Stats Europe

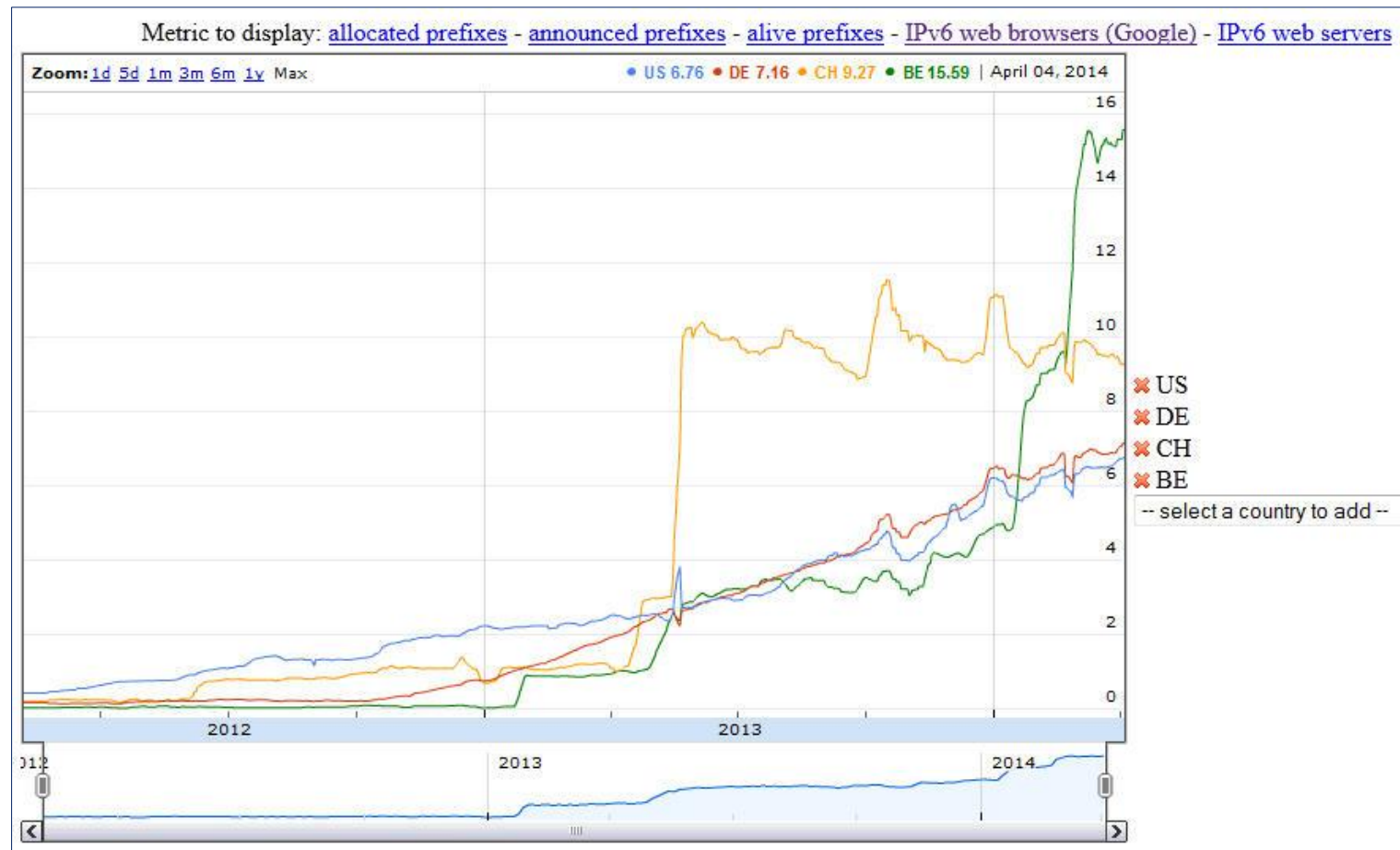


# Users USA - ~16 Mio users



6lab.cisco.com

# Vyncke Stats



<http://vyncke.org/ipv6status/compare.php?metric=p&countries=us,de,ch,be>

# How many users are these?

Country	Population Mio	Internet Users	Penetration rate	% of IPv6 Users	Number of IPv6 Users
Switzerland	7.9	6.5	82%	9.5%	650'000
Germany	81	67	83%	6.5%	4.3 Mio
France	65	52	79%	5.2%	2.7 Mio
Belgium	10	8	81%	9%	1.2 Mio
USA	313	245	78%	6.2%	15.2 Mio
China	1'343	538	40%	1.1%	5.9 Mio
Japan	127	101	79%	3.48%	3.5 Mio
<b>Global</b>	<b>7 Bio</b>	<b>2.4 Bio</b>	<b>34%</b>	<b>3%</b>	<b>72 Mio</b>

**Doubling approx. every nine month**



# Address Allocation IPv4 - Worldview

## ■ IANA Pool (unallocated addresses)

- |                |                 |
|----------------|-----------------|
| ■ October 2005 | 64 /8 (Class A) |
| ■ January 2008 | 42 /8           |
| ■ January 2009 | 34 /8           |
| ■ January 2010 | 24 /8           |
| ■ June 2010    | 16 /8           |
| ■ October 2010 | 12 /8           |
| ■ Feb 3, 2011  | zero            |

**Address Consumption doubled in 2010!**

## ■ Projected end of IPv4 pools:

- |             |             |
|-------------|-------------|
| ■ IANA Pool | Feb 3, 2011 |
| ■ RIR Pools | 2011/2012   |

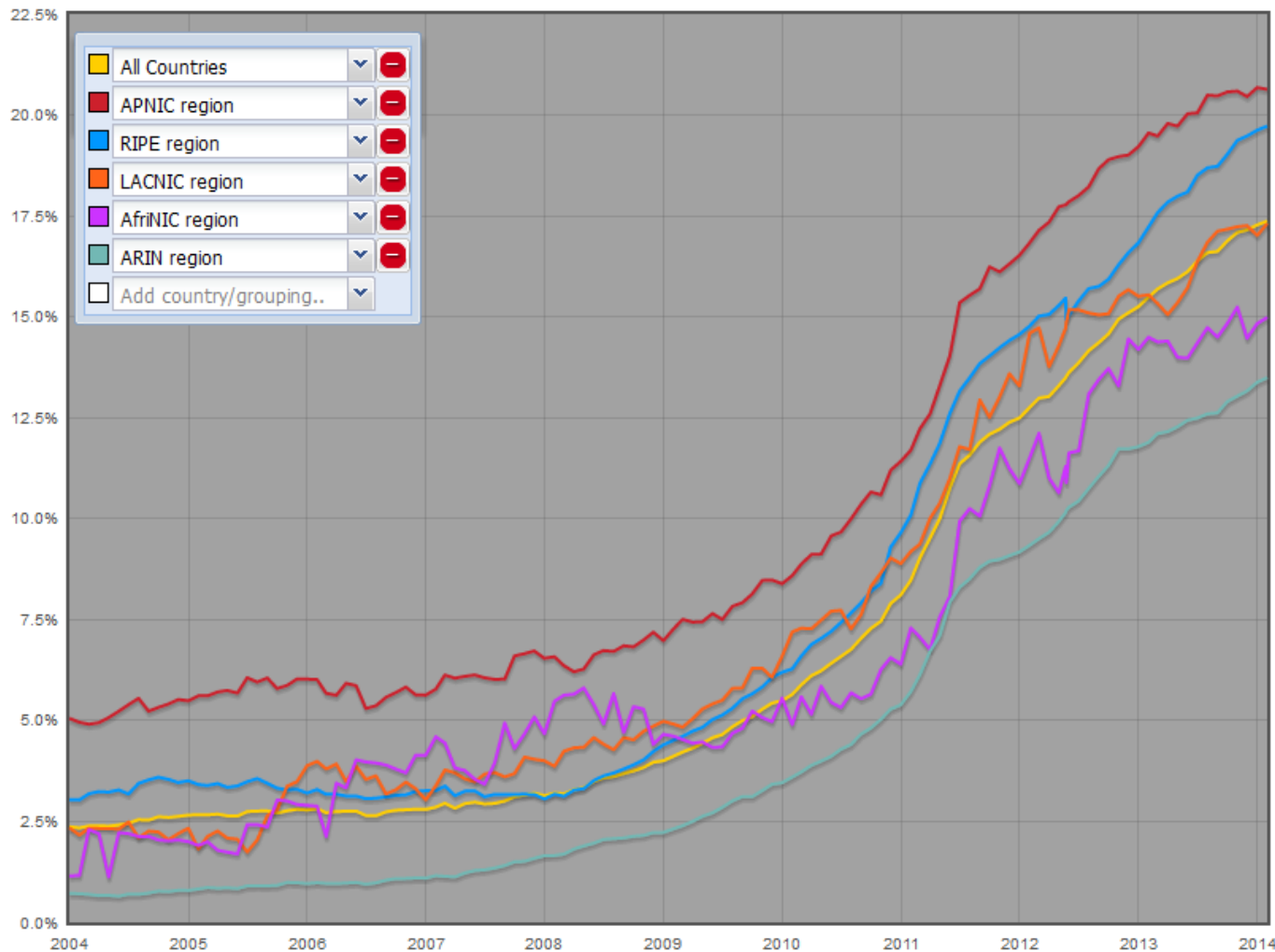
- Source: <http://www.potaroo.net/tools/ipv4>

<http://ipv6.he.net>



# Percentage AS that announce IPv6 Prefix

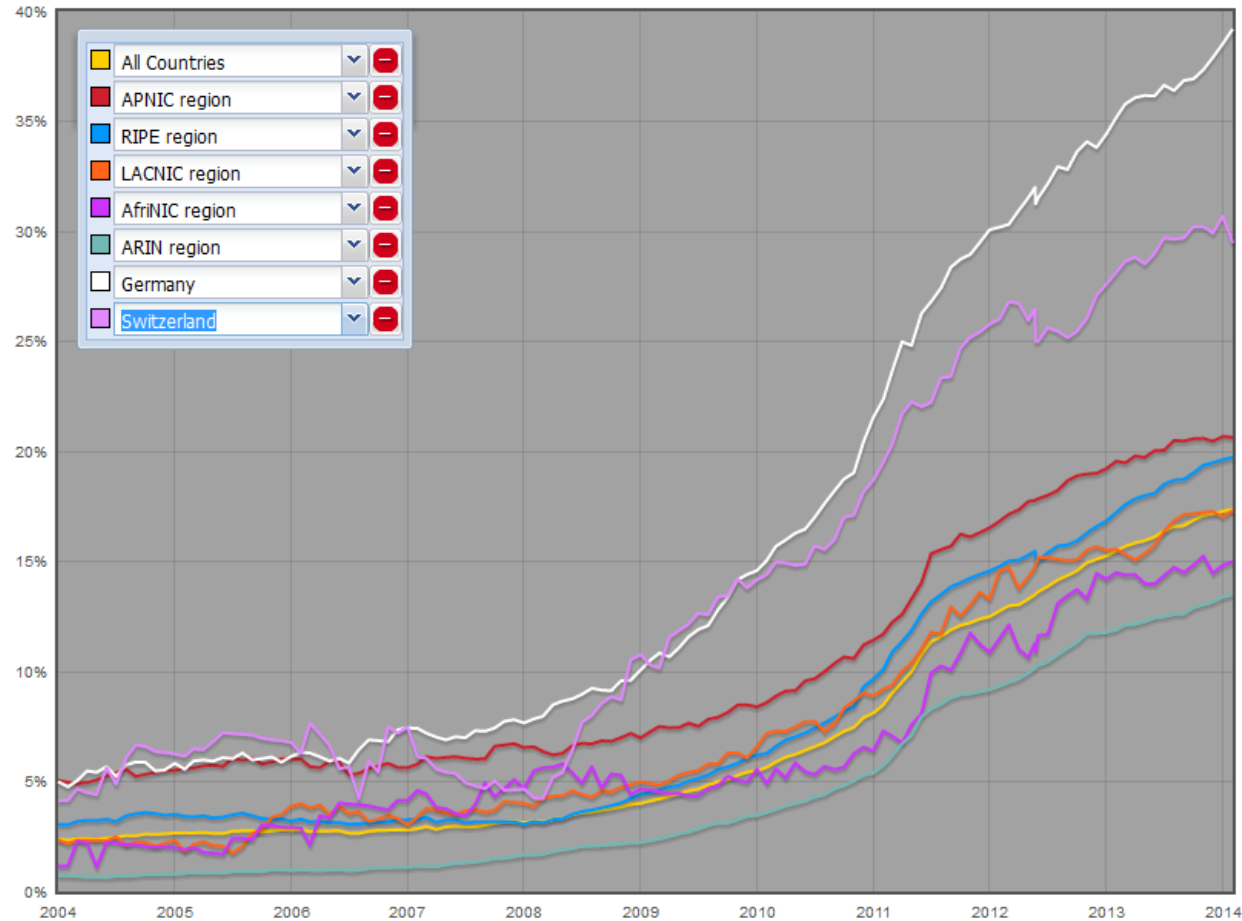
This graph shows the percentage of networks (ASes) that announce an IPv6 prefix for a specified list of countries or groups of countries



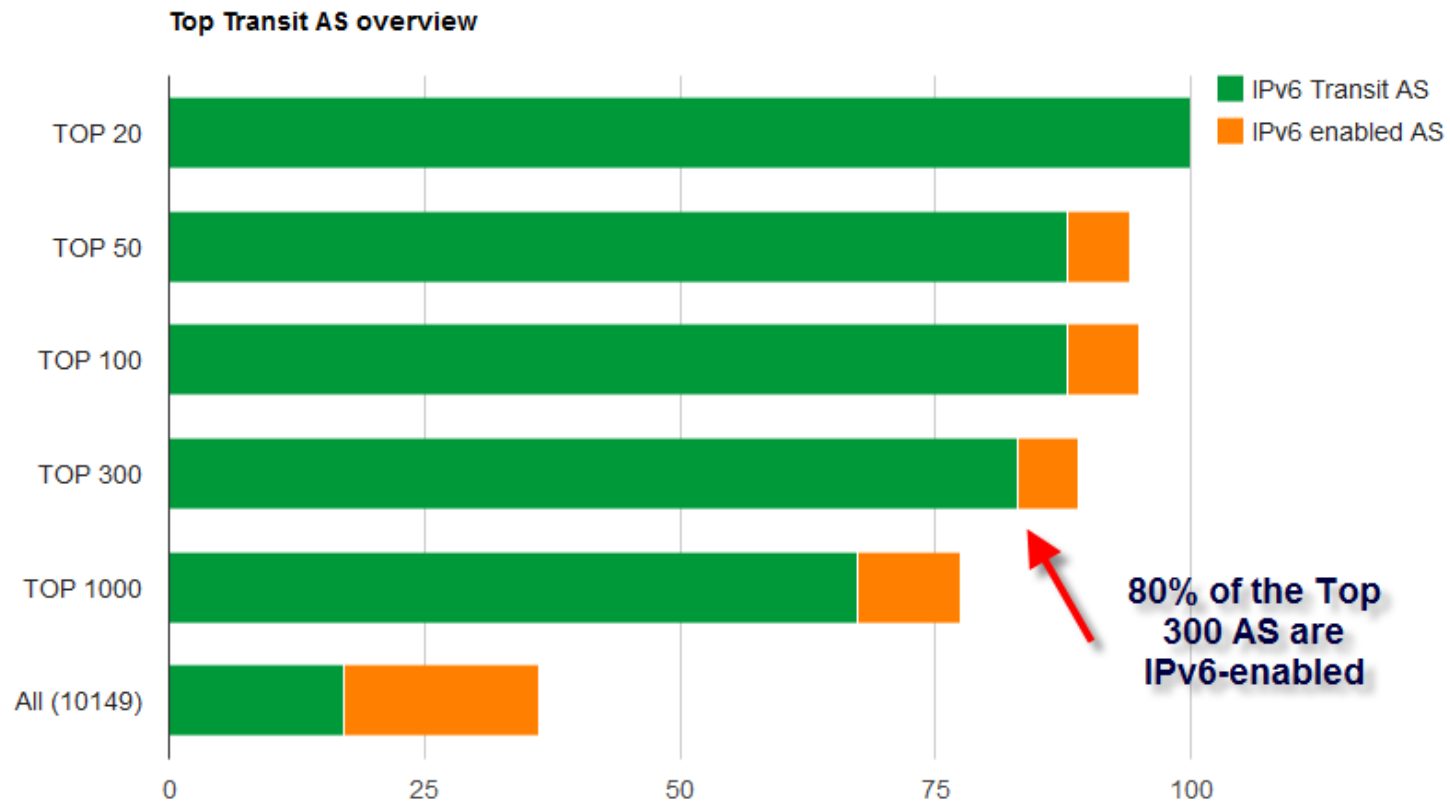
From  
<http://v6asns.ripe.net/v/6>

# Surprise ;-)

This graph shows the percentage of networks (ASes) that announce an IPv6 prefix for a specified list of countries or groups of countries



# Top Transit AS Overview



Data Source: [6lab.cisco.com](http://6lab.cisco.com)

# Worldipv6launch.org

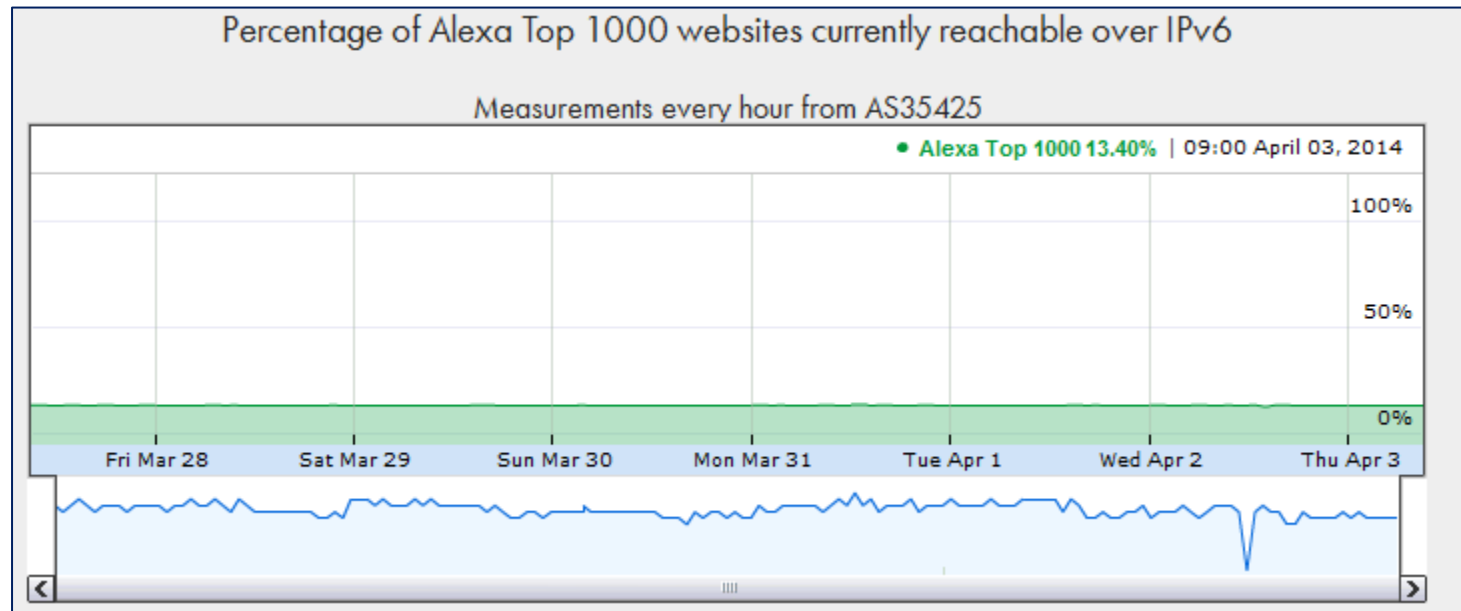
Network operator measurements, 17th March 2014 ([notes](#))

Show 25 ▾ entries			Search: <input type="text"/>
Participating Network ▾	ASN(s) ▾	IPv6 deployment ▾	
<a href="#">Comcast</a>	7015, 7016, 7725, 7922, 11025, 13367, 13385, 20214, 21508, 22258, 33287, 33489, 33490, 33491, 33650, 33651, 33652, 33653, 33654, 33655, 33656, 33657, 33659, 33660, 33661, 33662, 33664, 33665, 33666, 33667, 33668, 36733	25.01%	
<a href="#">ATT</a>	6389, 7018, 7132	16.95%	
<a href="#">KDDI</a>	2516	10.58%	
<a href="#">Verizon Wireless</a>	6167, 22394	47.48%	
<a href="#">Free</a>	12322	37.95%	
<a href="#">Time Warner Cable</a>	7843, 10796, 11351, 11426, 11427, 12271, 20001	6.54%	
<a href="#">Deutsche Telekom AG</a>	3320	18.76%	
<a href="#">RCS &amp; RDS</a>	8708	25.06%	
<a href="#">Telenet</a>	6848	28.35%	
<a href="#">Liberty Global</a>	5089, 6830, 20825, 29562	2.83%	
Telefonica del Peru	6147	7.65%	
Swisscom	3303	25.54%	
SoftBank BB	17676	3.28%	
Chubu Telecommunications	18126	22.75%	
Hughes Network Systems	6621	27.70%	



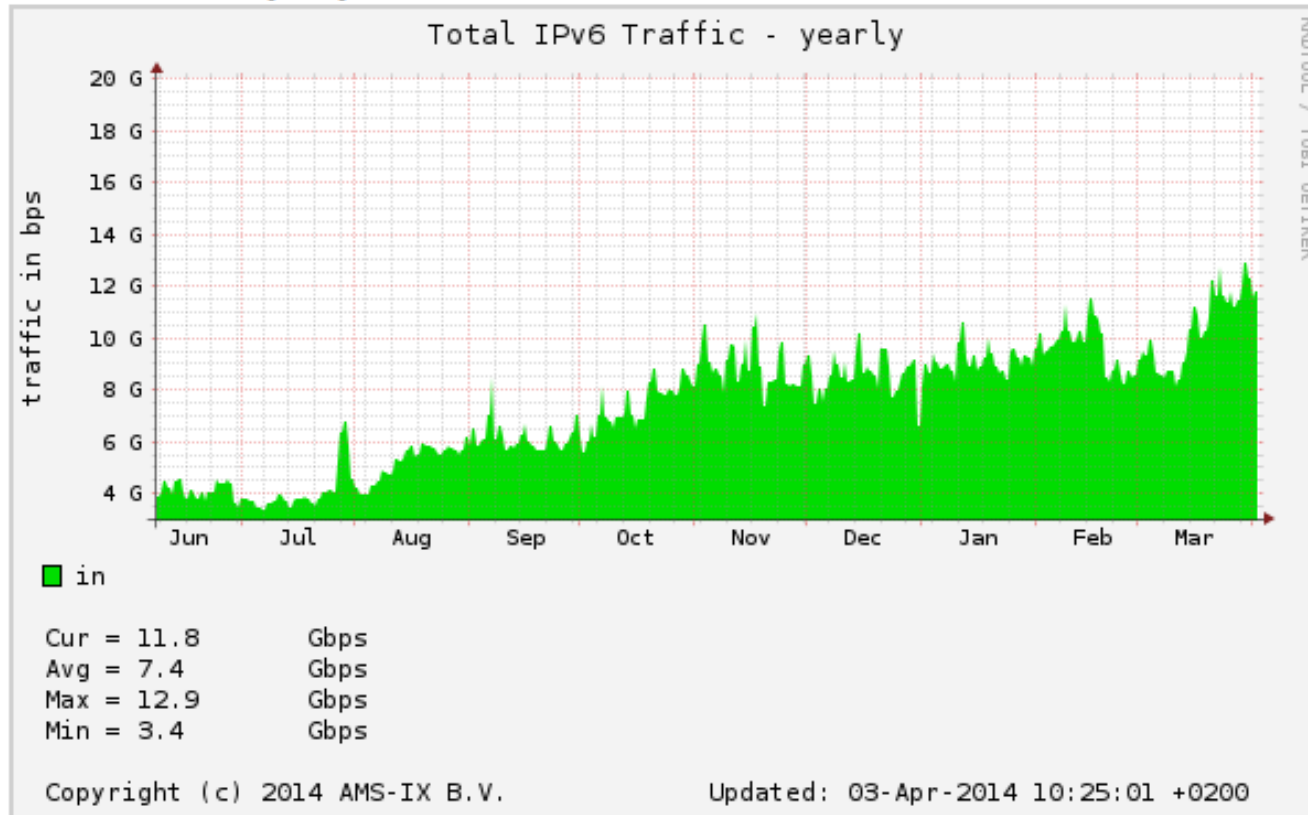
# Worldlaunch – Top Alexa 1000 Sites

This is where we need to create awareness  
and get things moving!



# AMS-IX

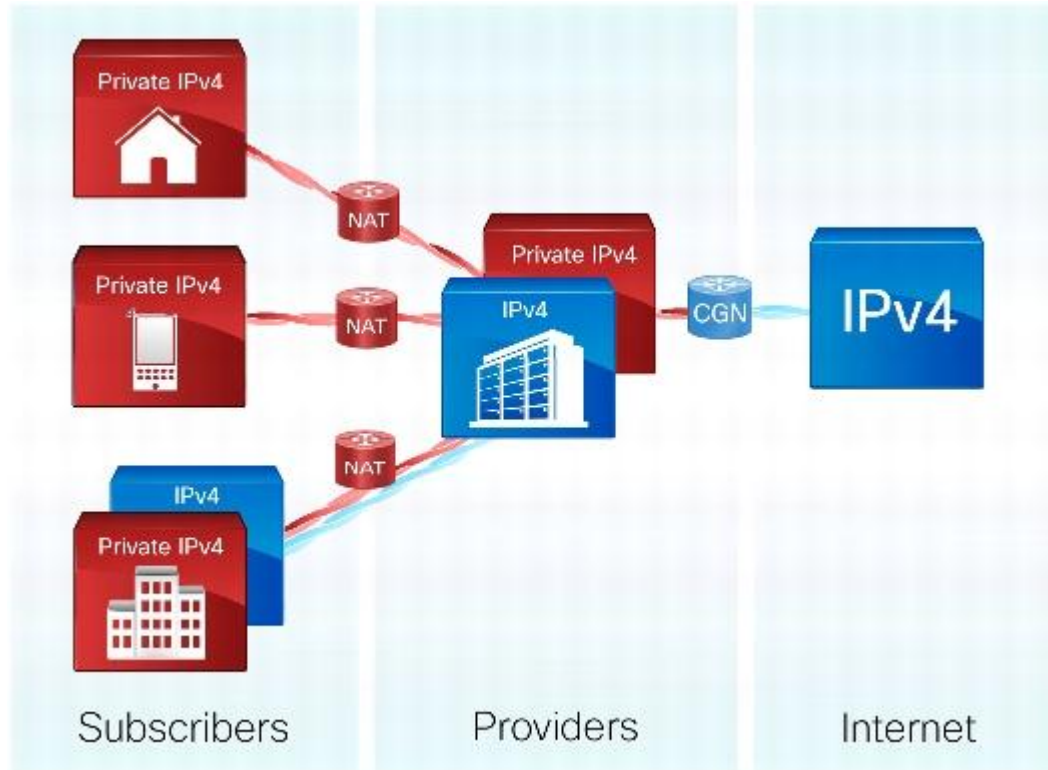
Total IPv6 Traffic - yearly



# New Internet Users

- Many will have difficult IPv4 access:
  - NAT-ed IPv4 Internet Access (possibly multiple NATs with CGN)
  - IPv6-only Internet Access with translation for IPv4 Internet (NAT64/DNS64)
- Internet Access to IPv6 sites will soon outperform access to the IPv4 Internet
  - As a content provider you are interested in offering your content over IPv6 as soon as possible
  - Business Analytics!  
(why is Google interested in the deployment of IPv6? ;-)

# CGN / LSN

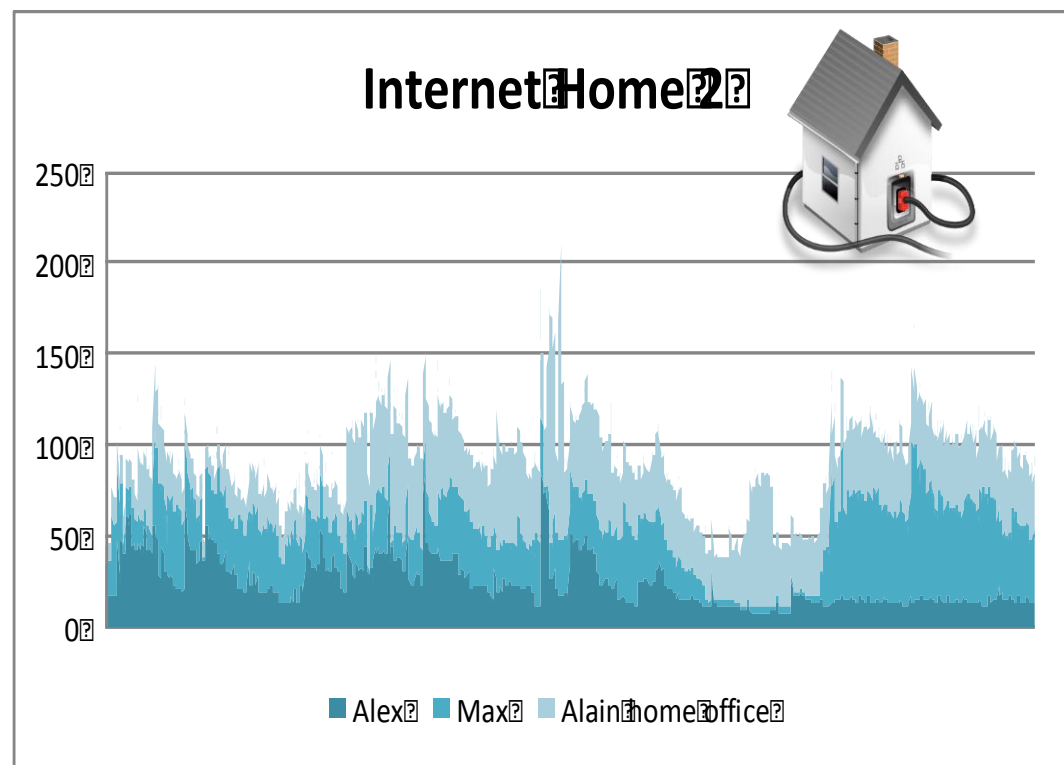


**Customer  
cannot be  
identified by IP  
address  
anymore**

**Number of  
sessions  
limited (ports)**

[www.cisco.com](http://www.cisco.com)

# Real world Session Statistics



## Peer to Peer:

- BitTorrent: >700

## Portals/Social

- Facebook: 40 sessions
- Yahoo: 110 sessions
- Bing: 30
- G+: 30
- Wikipedia: 50
- Twitter : 20

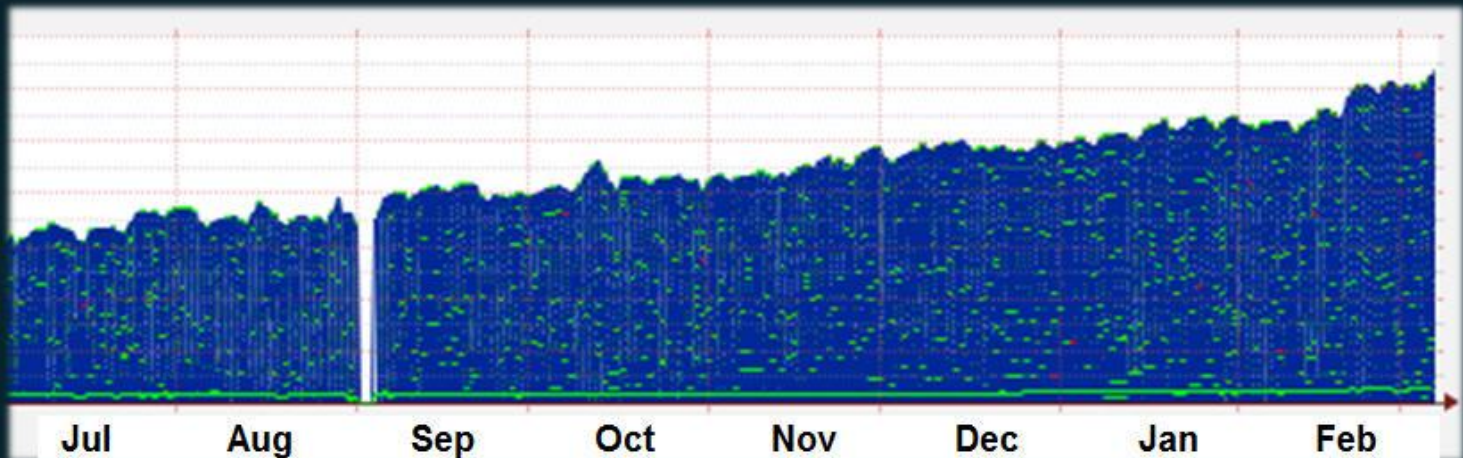
## VoD/TV Replay platforms

- Canal plus : 70 sessions
- Pluzz.fr: 95 sessions
- BBC : 45 sessions
- CNN: 50



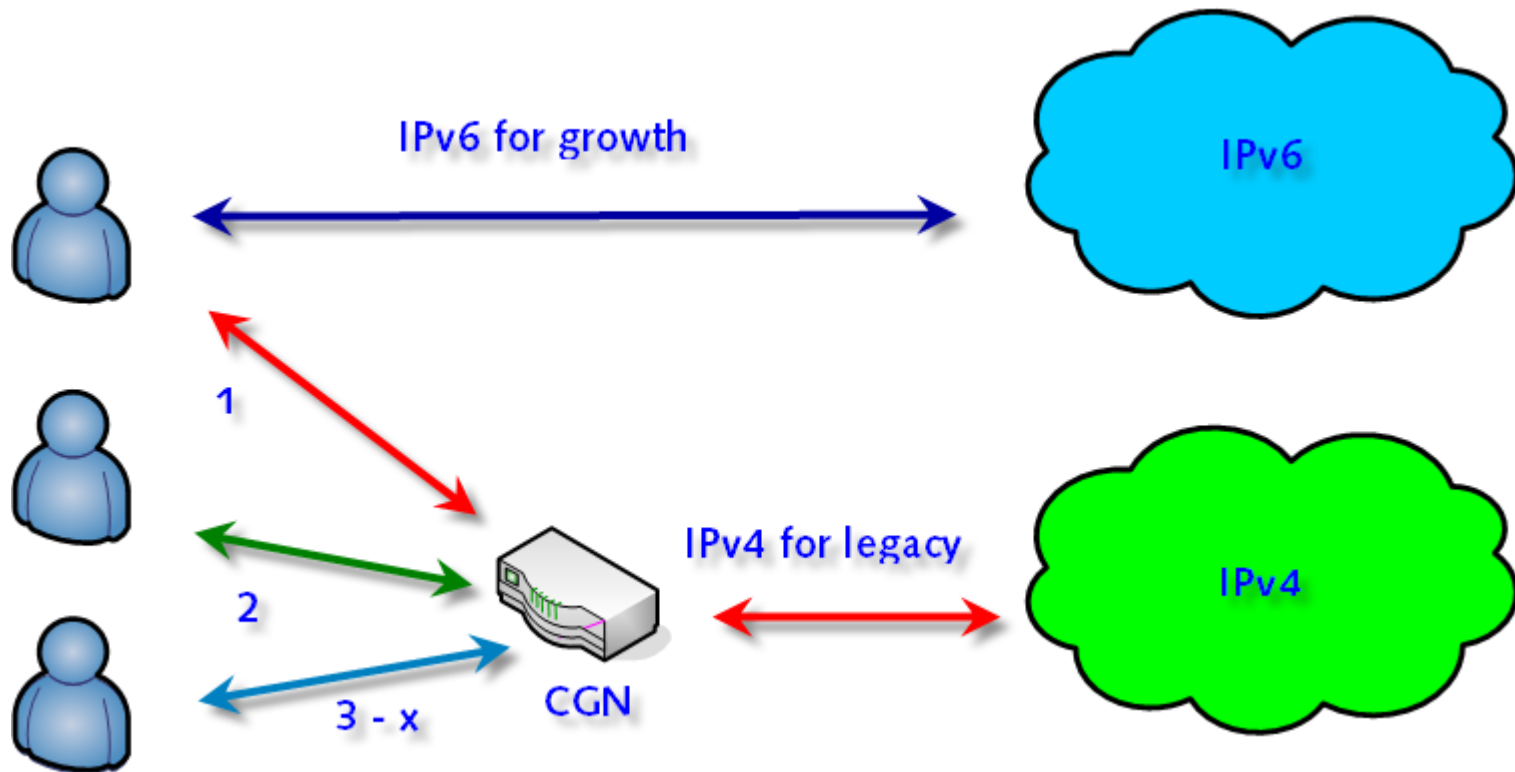
# Connections on the rise

## NAT44 Session State Growth in a Real Mobile Network



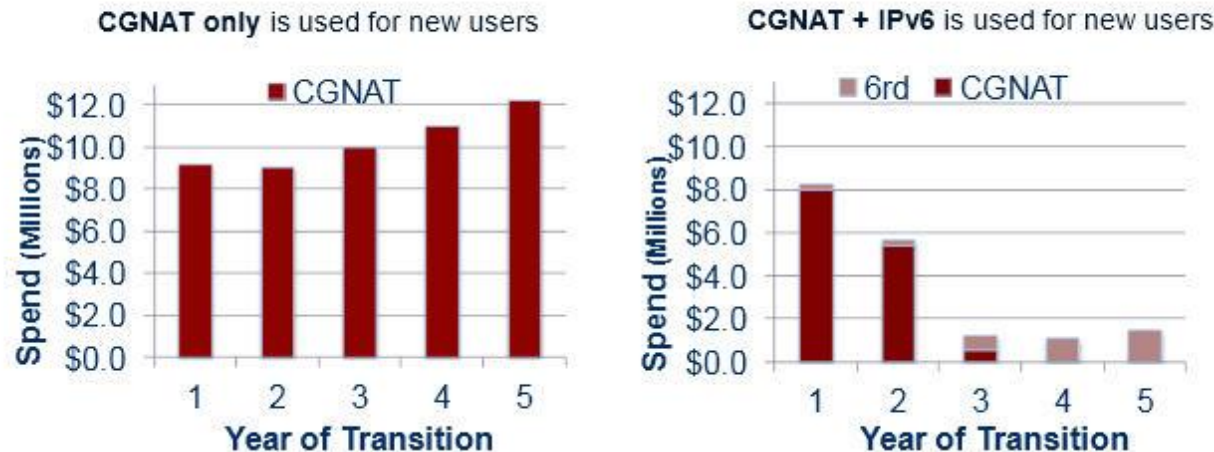
X 2 over 8 months. Accelerating with Smartphone penetration  
=> More sophisticated apps => more tcp sessions + keepalive

# ISP Strategy and Business Case: Deploy IPv6



# Business Case for delivering IPv6 now

Capex Comparison of IPv6 Strategies



**69%<sup>1</sup> capex savings by turning on 6rd + CGNAT  
(6rd solution eases CGNAT requirements and paves  
path to Dual Stack)**

1 SP with 5M residential subs and a 10% yoy growth; no additional cost is incurred for turning on 6rd in CPE  
2 Each device uses an average of 500 sessions due to high session applications

Source: IDC, 2012

SP with 5 Mio subscr.

Each home allocated 500 sessions

Annual subsc growth rate 10%

Content 25% in first year, going up to 95% in 5th year

Cost for maintaining CGN in IPv4-only scenario growing

Cost for 6rd mainly initial capital cost

[http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns1017/idc\\_ipv6\\_economics.pdf](http://www.cisco.com/en/US/solutions/collateral/ns341/ns525/ns1017/idc_ipv6_economics.pdf)

# Upcoming Events

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- **Member Event, April 28, 6 pm to 9 pm, at Digicomp Zurich**
  - **Nathalie Trenaman, RIPE NCC on Addressing**
  
- **IPv6 Business Conference, June 17, Arena Sihlcity, Zurich**
  - **2 Tracks (Business and Technical)**
  - **Lineup of international speakers**
  - **Early Bird registration until May 9**
  - **[www.ipv6conference.ch](http://www.ipv6conference.ch) (Program in the works)**

# Thank you for your participation



## Questions ?

**Become a member, receive our Newsletter**

**Contact:**

Swiss IPv6 Council, CH-8124 Maur

+41 44 887 62 10

[www.swissipv6council.ch](http://www.swissipv6council.ch)

[info@swissipv6council.ch](mailto:info@swissipv6council.ch)

Twitter: [twitter.com/IPv6councilCH](https://twitter.com/IPv6councilCH)

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