

# Deploying IPv6

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# Jeg bruger Twitter

- Det er OK at tweete mens jeg taler
- Brug både #DD11 og #værksted
- @toreanderson

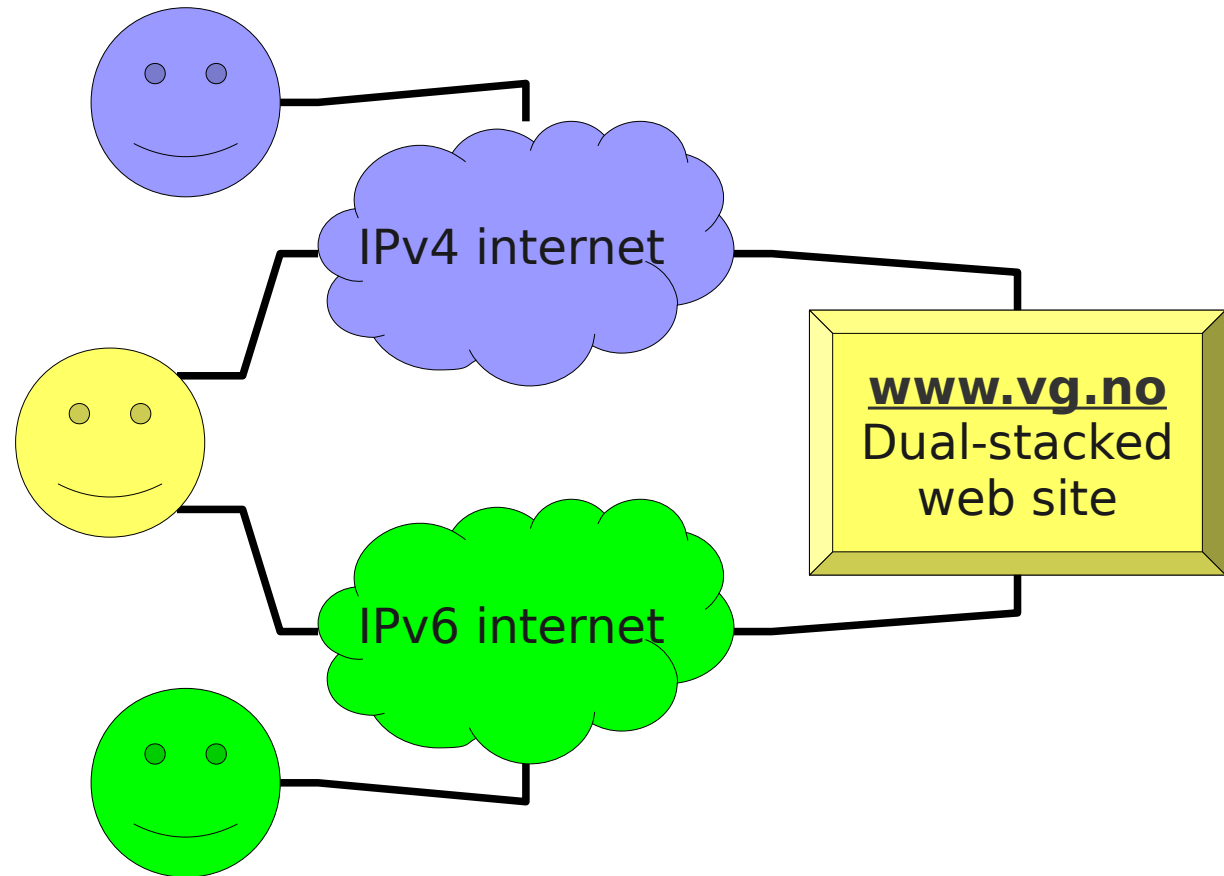
Følg sporene: #offsek #borgeric #tekogten #vækst #værksted #denfri

# Introduction

- We do pretty much anything that involves Open Source Software
- Local presence in Denmark, Finland, Norway, and Sweden
- I'm on network/infrastructure team within **Managed Services**, who maintains and hosts our customers' applications, such as:
  - VG Multimedia: [www.vg.no](http://www.vg.no)
  - A-pressen Digitale Medier: ~70 Norwegian newspapers
  - JP/Politikens Hus: [www.eb.dk](http://www.eb.dk), [www.jp.dk](http://www.jp.dk), [www.politiken.dk](http://www.politiken.dk)
- In 2009-2010 we deployed IPv6 for both VG and A-pressen
  - Unfortunately JP/Pol isn't hosted in any of our data centres, so it would be more difficult to do the same for them :-)

# Dual stack theory

- IPv4 and IPv6 are unaware of each other
- Logically they are two independent «internets»
- «Dual stack» simply means that a node have connectivity to both



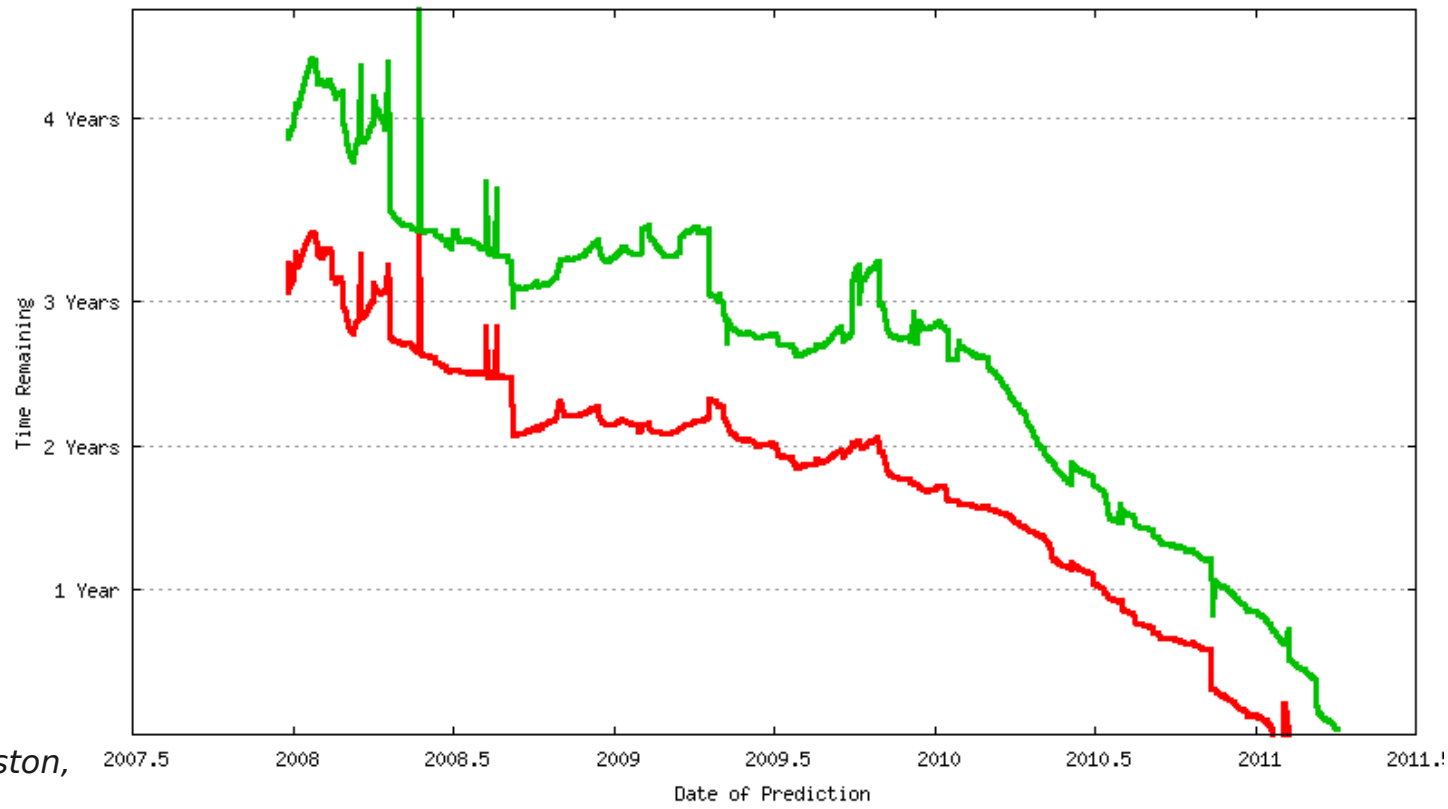
- When both end points are dual stacked, IPv6 is usually preferred

# Dual-stacking the data centre

- Good selection of wholesale IP capacity providers with support
- Mature support from most serious network equipment vendors
- Easy to get address space (in exorbitant amounts)
- It's not very different from IPv4
  - *«96 more bits, no magic»*
- It just took us a couple of months to deploy dual-stack across our entire IP backbone and data centre infrastructure
  - Using only the free «in-between» time of two engineers
  - IPv6 support in normal equipment refresh cycles; no CAPEX
- It's **easy!**
  - Start at the outer network border, work your way inwards

# But why bother?

- There was hardly any IPv6-capable end users in Norway
  - Providing IPv6 content - catering to a non-existent audience
- However, the internet is about to run out of IPv4 addresses...



(Source: Geoff Huston,

<http://ipv4.potaroo.net>)

# IPv4 depletion and CGNs

- IPv4 depletion will inevitably result in **Carrier Grade NATs**
  - Provides IPv4 address sharing between multiple subscribers
- Only way an ISP can grow its customer base post depletion
- CGNs will inevitably cause the the IPv4 internet to **deteriorate**
  - Reduced performance - NAT is very resource intensive
  - Increased costs - CGN systems is very expensive
  - Geolocation will identify the CGN's location, not the end user





# IPv6 is the only rational solution

- An alternate IPv6 path will avoid CGNs and their problems
- The ISP and the content provider must **both** support IPv6
- Commonly heard complaint from Norwegian ISPs:

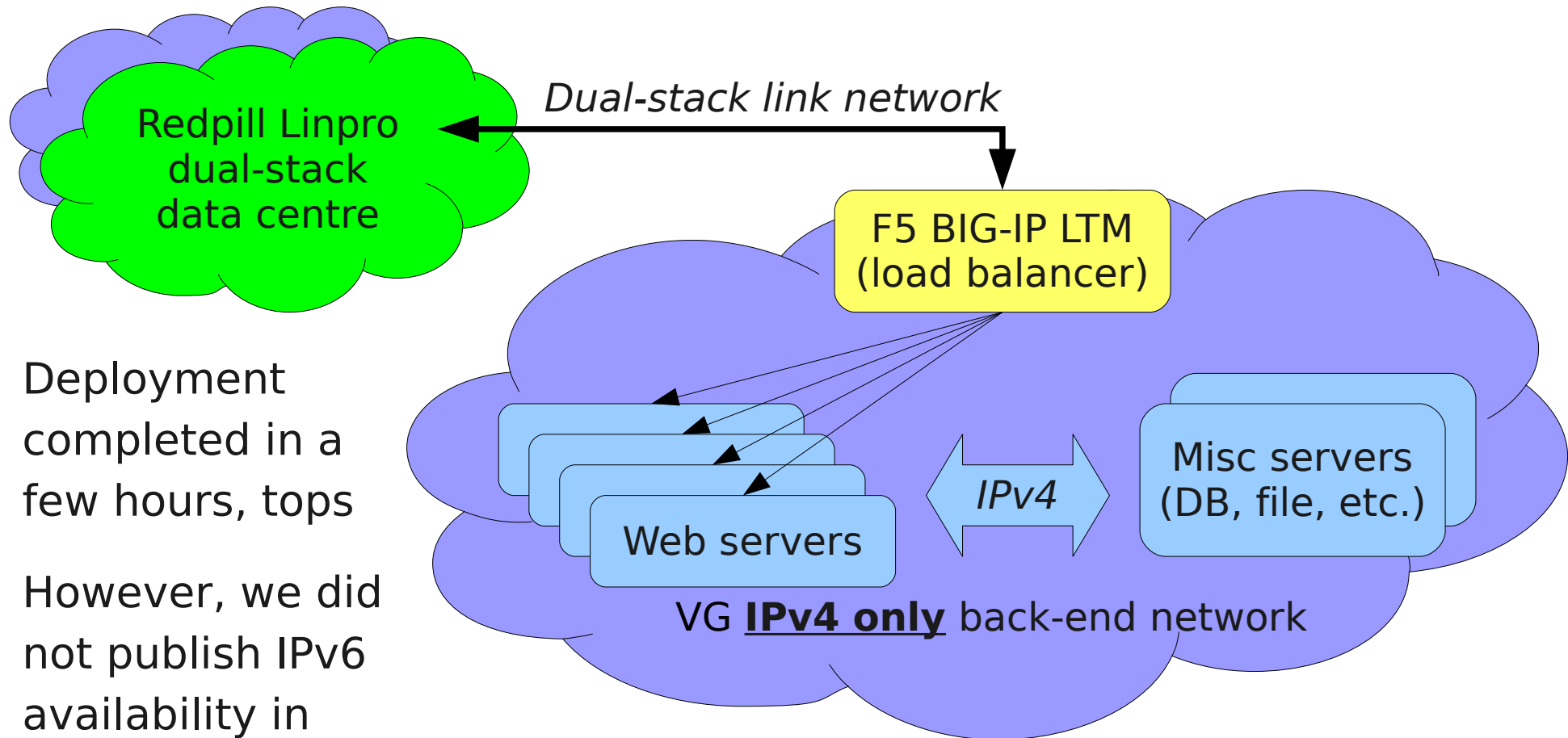
«**There's no IPv6 content!**»

- We wanted to change that
- **Everyone benefits**
  - Better performance
  - Smaller and cheaper CGNs
  - Better location awareness
  - Only way to sunset IPv4



# Deployment for VG Multimedia

- There's no real reason to retrofit IPv6 to an IPv4-only server farm
  - Just do the public entry point (load balancer, web server, etc.)



- Deployment completed in a few hours, tops
- However, we did not publish IPv6 availability in DNS right away

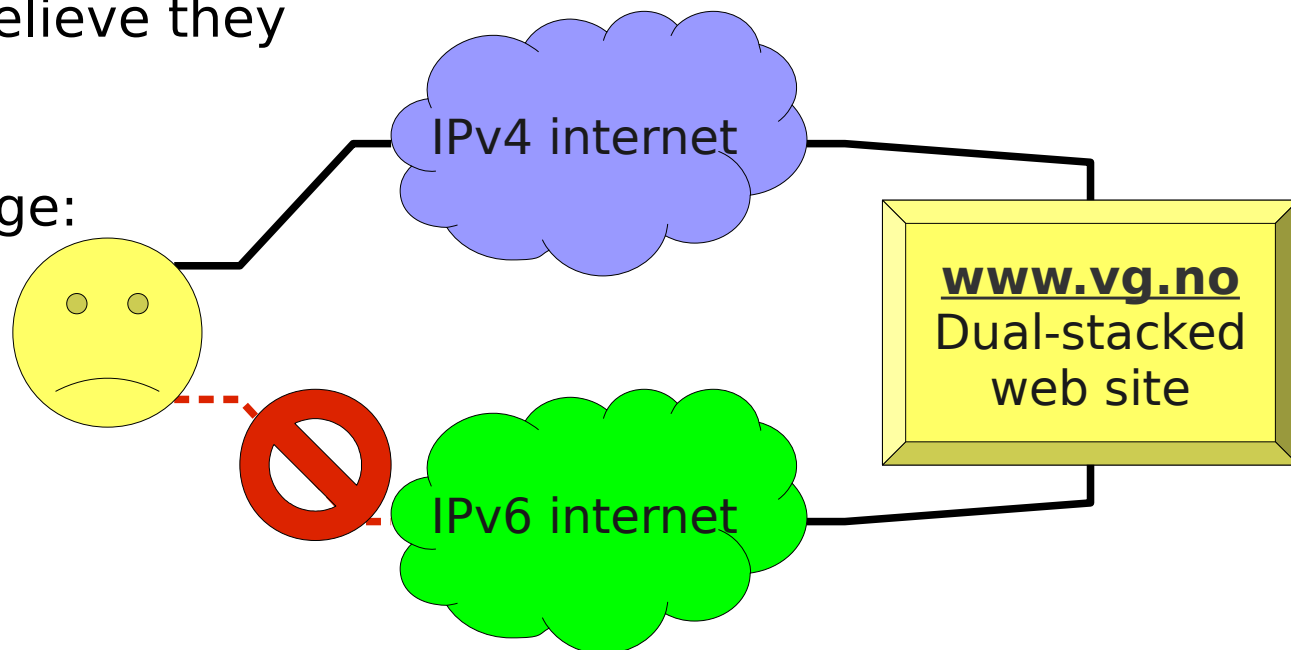
*(A-pressen's deployment is very similar)*

# Dual stack «brokenness»

- A small fraction of end users' computers mistakenly believe they have IPv6 connectivity

- When opening a web page:

1. IPv6 is tried
2. 20-75 seconds pass
3. IPv6 times out
4. IPv4 is used instead



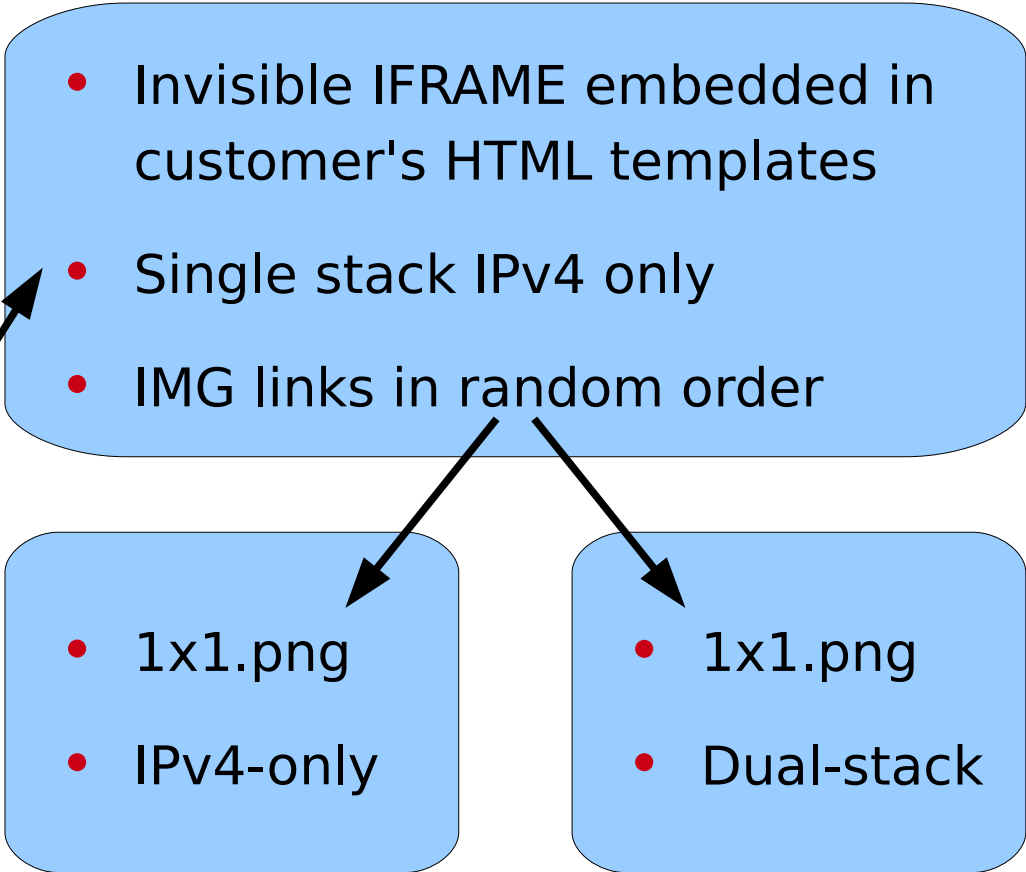
- Unacceptable service degradation for end users

- For a live demo, go to **<http://broken.redpill-linpro.com>**

- The problem is caused by bugs in web browsers, operating systems, and home networking equipment - usually not the users' fault

# Measuring IPv6 reliability

- All of VG and A-pressens readers were enrolled in a background experiment that measured if they were «broken» or not
  - Results were continuously published at <http://fud.no/ipv6>

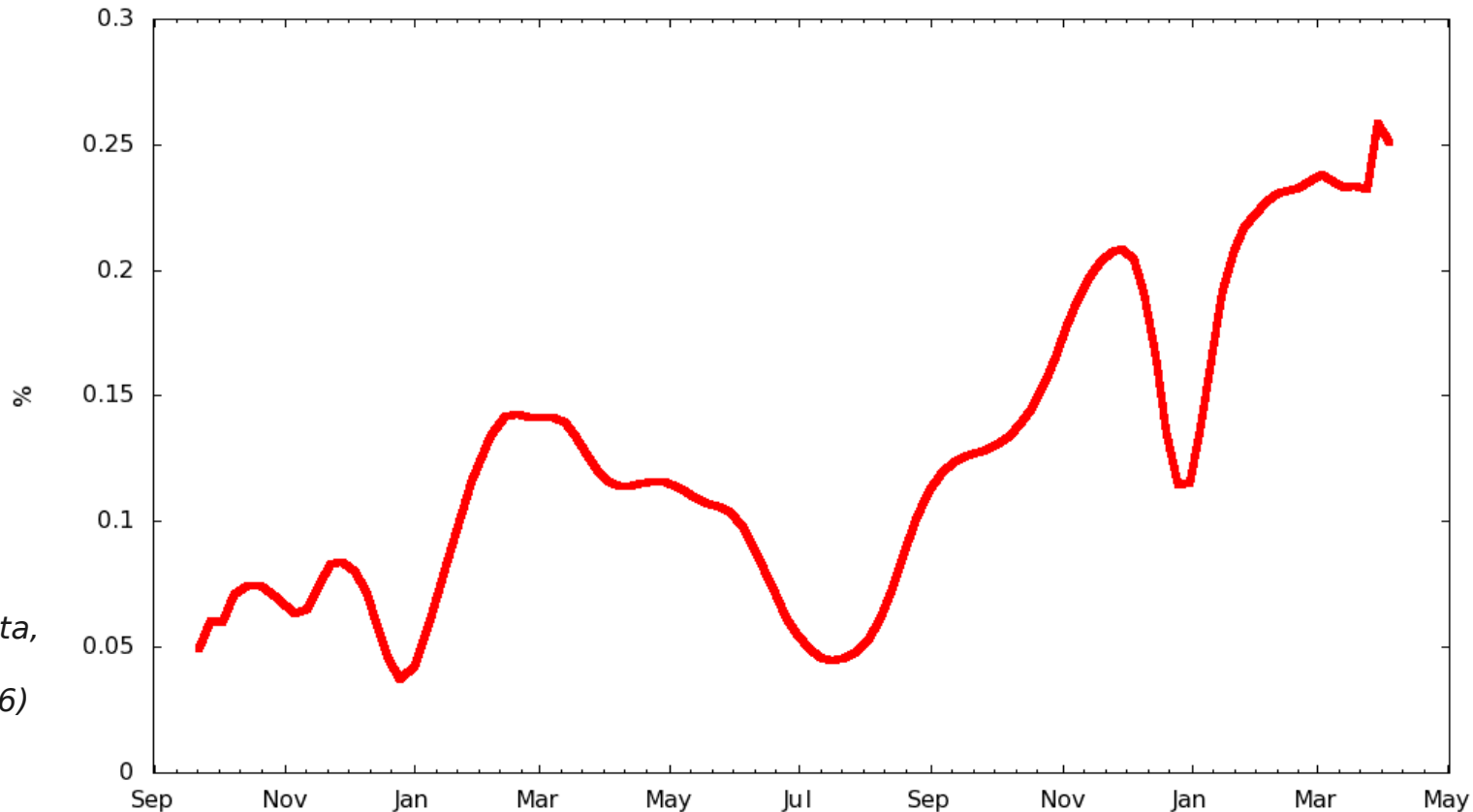


# Improving IPv6 reliability

- To begin with (Sep 2009), around **1 out of 400** users were broken
- Log analysis showed us what caused most of the problems
  - [http://getipv6.info/index.php/Customer\\_problems\\_that\\_could\\_occur](http://getipv6.info/index.php/Customer_problems_that_could_occur)
- We worked with the vendors/operators of the problematic software/networks, and got most common issues fixed
- 24-hour production test with AAAAs on the 26<sup>th</sup> Oct 2010
  - Google/Facebook/etc will do the same on **World IPv6 Day**
  - <http://isoc.org/wp/worldipv6day/>
- No complaints; **permanent production** from 21<sup>th</sup> Dec 2010
  - Broken users right before production: **1 out of 4000**
  - This has likely improved further, but we can't measure it

Have we helped foster  
IPv6 deployment?

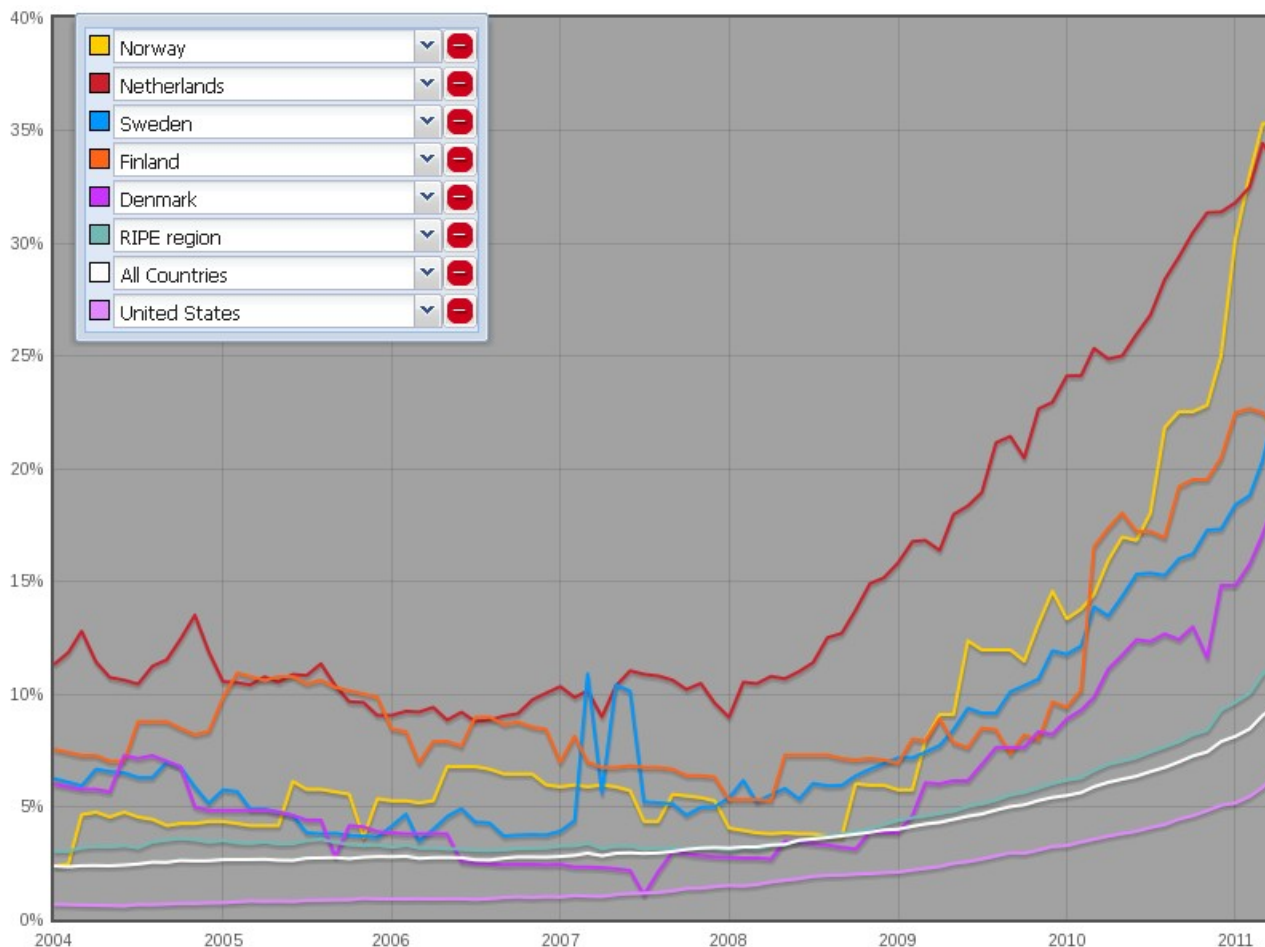
# Not as much as we'd hoped



(Source: own data,  
<http://fud.no/ipv6>)

- Only approx. **1 out of 400** Norwegian end users have native IPv6
- Student dormitories and university campuses for the most part
- University of Oslo's deployment came as a direct response to ours!

# But maybe soon?



(Source: RIPE NCC,  
<http://v6asns.ripe.net>)

- Colleagues in ISPs say it's become easier to prioritise IPv6 work
- Norway is now a world leader of IPv6 deployment in the ISP core networks - 35% have obtained and are announcing IPv6 addresses

# Wrapping it up

- IPv6 is production ready **today** and it's coming - fast
- So start thinking about deploying IPv6 in your organisation today
- And start demanding IPv6 support from your suppliers today:
  - Internet service providers
  - IT operations suppliers
  - Software vendors
  - Hardware vendors
  - *(Alternatively, accept the extra cost of out-of-schedule upgrades!)*
- The **Danish Government** should **lead by example**, both by exercising its power as a customer, and as a provider of public internet services
- Questions?