Welcome to

# IPv6 Status Denmark

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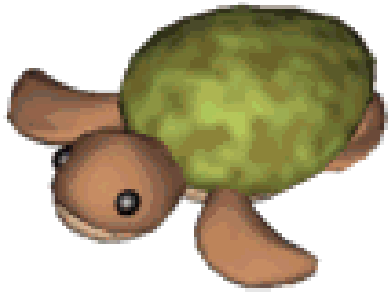
Slides are available as PDF

# Goal



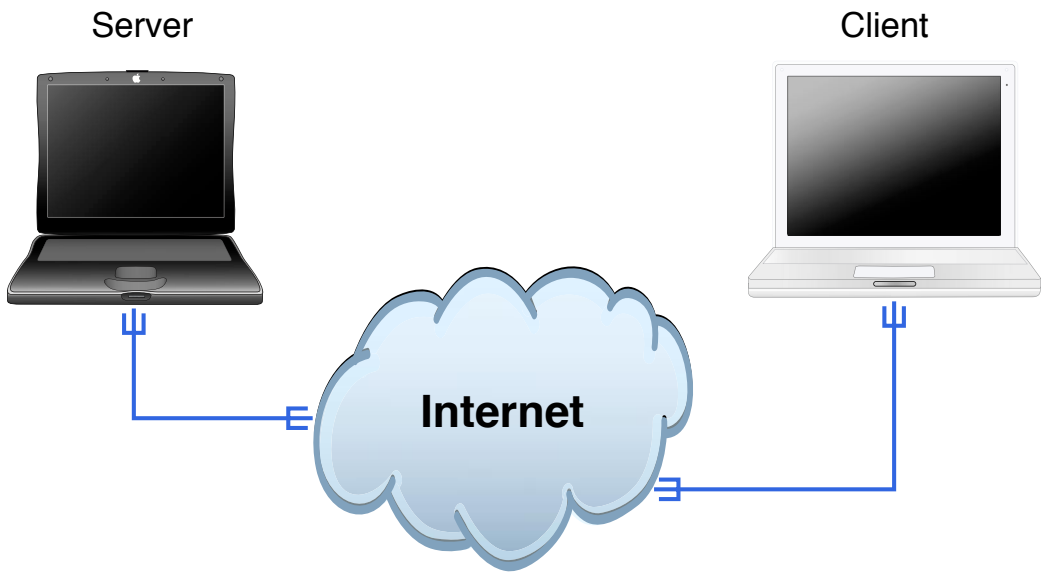
Introduce IPv6 - facts and features

IPv6 Status Denmark

Enabled providers and sites

How to get your site on IPv6

# Internet today




Clients and servers

Rooted in academic networks

Protocols which are more than 20 years old, moved to TCP/IP in 1981

# Internetworking: history

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1960s L. Kleinrock, MIT packet-switching theory, J. C. R. Licklider, MIT - notes Paul Baran: On Distributed Communications

1969 ARPANET 4 nodes

1971 14 nodes

1974 TCP/IP: Cerf/Kahn: A protocol for Packet Network Interconnection

1983 Switching from NCP to IP/TCP

1983 EUUG → DKUUG/DIKU forbindelse

1988 About 60.000 systems on the internet - The Morris Worm hits about 10%

2010 IANA reserved blocks 7% (Maj 2010) - `http://www.potaroo.net/tools/ipv4/`

2011 February 3 IANA pool ran out - last 5 /8 allocated to RIRs

2011 April 15 APNIC ran into their last /8 and started a more restrictive policy

# Future - 2010 and beyond

**The Mobile Network in 2010 and 2011**

Global mobile data traffic grew 2.6-fold in 2010, nearly tripling for the third year in a row. The 2010 mobile data traffic growth rate was higher than anticipated. Last year's forecast projected that the growth rate would be 149 percent. This year's estimate is that global mobile data traffic grew 159 percent in 2010.

...

Last year's mobile data traffic was three times the size of the entire global Internet in 2000. Global mobile data traffic in 2010 (237 petabytes per month) was over three times greater than the total global Internet traffic in 2000 (75 petabytes per month).

...

There will be 788 million mobile-only Internet users by 2015. The mobile-only Internet population will grow 56-fold from 14 million at the end of 2010 to 788 million by the end of 2015.

Kilde: *Cisco Visual Networking Index: Global Mobile Data Traffic Forecast Update, 2010 - 2015*

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# Really how to use IPv6?

Get IPv6 address and routing

Add AAAA (quad A) records to your DNS

Done

www.solidonetworks.com

```
www         IN A          91.102.95.20
            IN AAAA       2a02:9d0:10::9
```

# IPv6 Status Denmark

IT- og Telestyrelsen are becoming more active

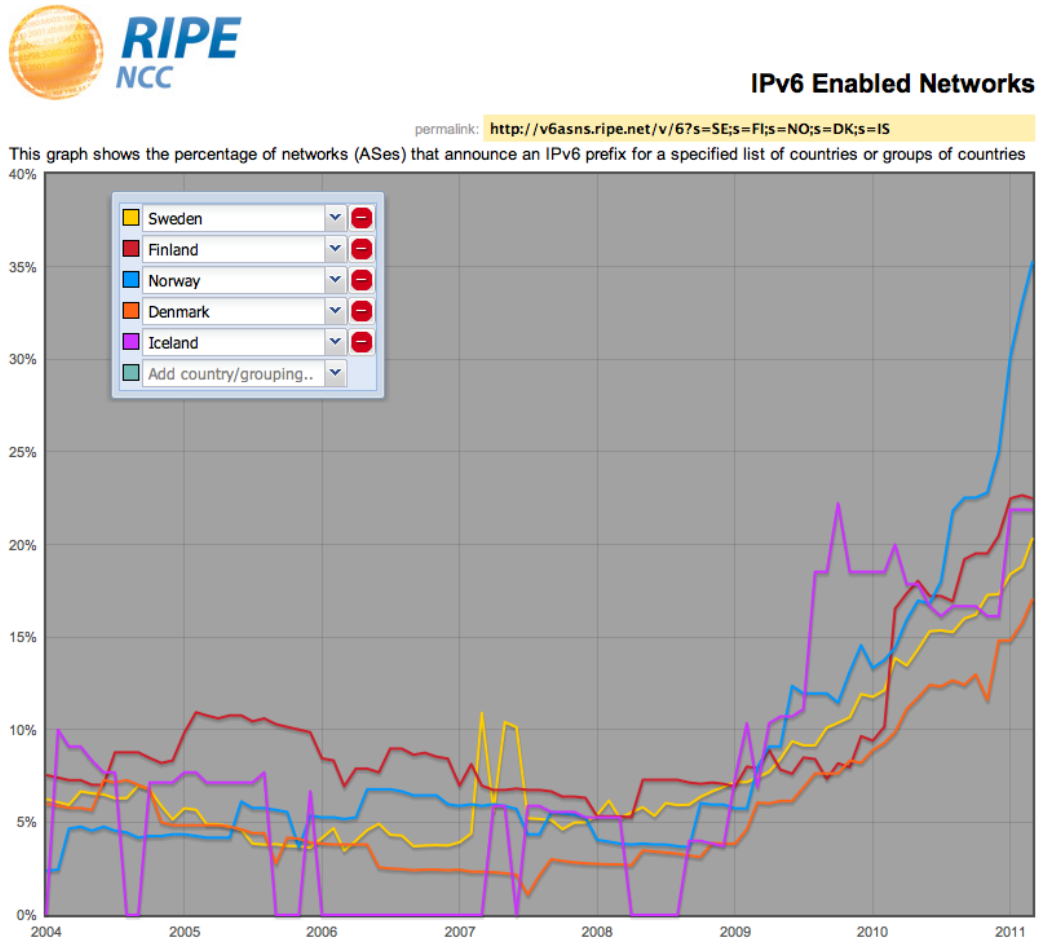
Unofficial IPv6 task force at `http://www.ipv6tf.dk/`

Other initiatives `http://world-ipv6-day.dk/`

Major providers are ready on back bones

Internet Providers are increasingly becoming ready

# IPv6 in the Nordic region




http://v6asns.ripe.net/v/6?s=_ALL;s=DK;s=SE;s=NO;s=NL

# Current status Denmark

Too little interest - less than 100 people thinking about IPv6?

Some providers have some IPv6 connectivity

Perceived NO NEEED

Free, a major French ISP rolled-out IPv6 at end of year 2007

XS4All As of August 2010 native IPv6 DSL connections became available to almost all their customers.

Source: `http://en.wikipedia.org/wiki/IPv6_deployment`

# Enabled providers and sites

The ones we know of who support IPv6:
Nianet, TDC, Netgroup, Lynero, Solido, Gratisdns, DK-hostmaster

The missing in action - what are they doing?
Telenor, Telia

The ones we think are ignoring IPv6: Jaynet,

Enabled sites: `http://www.tdc.dk`, `http://www.lynero.dk`,
`http://www.solidohosting.com`,`www.feriebolig-spanien.dk`,
`http://www.dk-hostmaster.dk`,`http://mirrors.dotsrc.org`

# How to get your site on IPv6

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Practical information for your network

Strategy and actions points

- Collect information about IPv6
- Collect information about your network
- Collect information about your hosts and services
- Ask your providers for IPv6 plans
- Experiment with IPv6 - today
- Implement small proof of concept, in production!
- Expand coverage

# Implications


For an IPv4 enterprise network, the existence of an IPv6 overlay network has several of implications:

- The IPv4 firewalls can be bypassed by the IPv6 traffic, and leave the security door wide open.
- Intrusion detection mechanisms not expecting IPv6 traffic may be confused and allow intrusion
- In some cases (for example, with the IPv6 transition technology known as 6to4), an internal PC can communicate directly with another internal PC and evade all intrusion protection and detection systems (IPS/IDS). Botnet command and control channels are known to use these kind of tunnels.

Kilde:

`http://www.cisco.com/en/US/prod/collateral/iosswrel/ps6537/ps6553/white_paper_c11-629391.html`

# Collect information about IPv6

*Guidelines for the Secure Deployment of IPv6*, SP800-119, NIST
`http://csrc.nist.gov/publications/nistpubs/800-119/sp800-119.pdf`

*The Second Internet: Reinventing Computer Networks with IPv6*, Lawrence E. Hughes, October 2010,
`http://www.secondinternet.org/`

*IPv6 Network Administration* af David Malone og Niall Richard Murphy

`http://www.ripe.net`

This presentation ☺

# Allocating IPv6 addresses

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You have plenty!

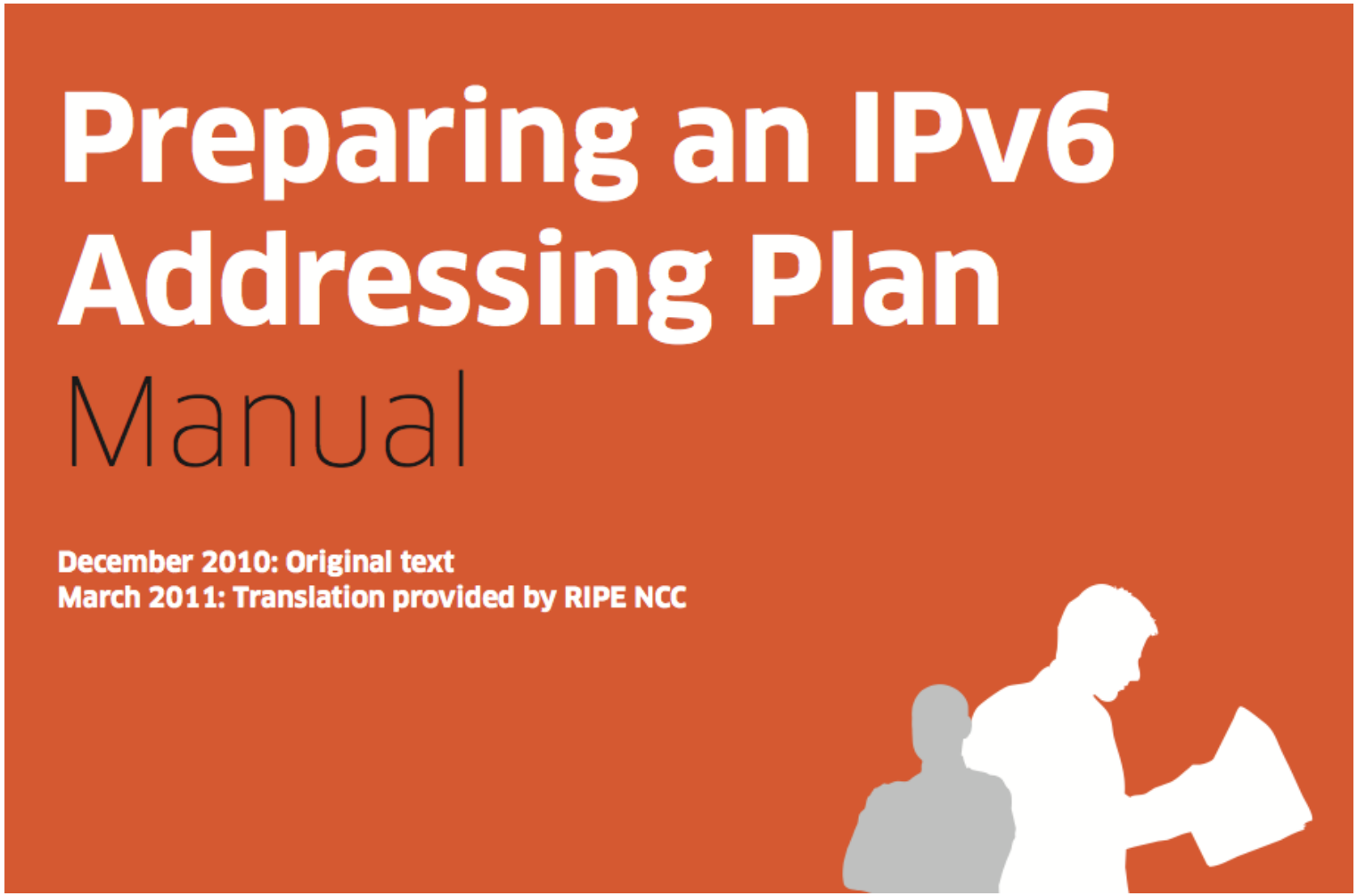
Providers and LIRs will typically get /32

Providers will typically give organisations /48 or /56

Your /48 can be used for:

- 65536 subnets - all host subnets are /64
- Each subnet has $2^{64}$ addresses

# Preparing an IPv6 Addressing Plan



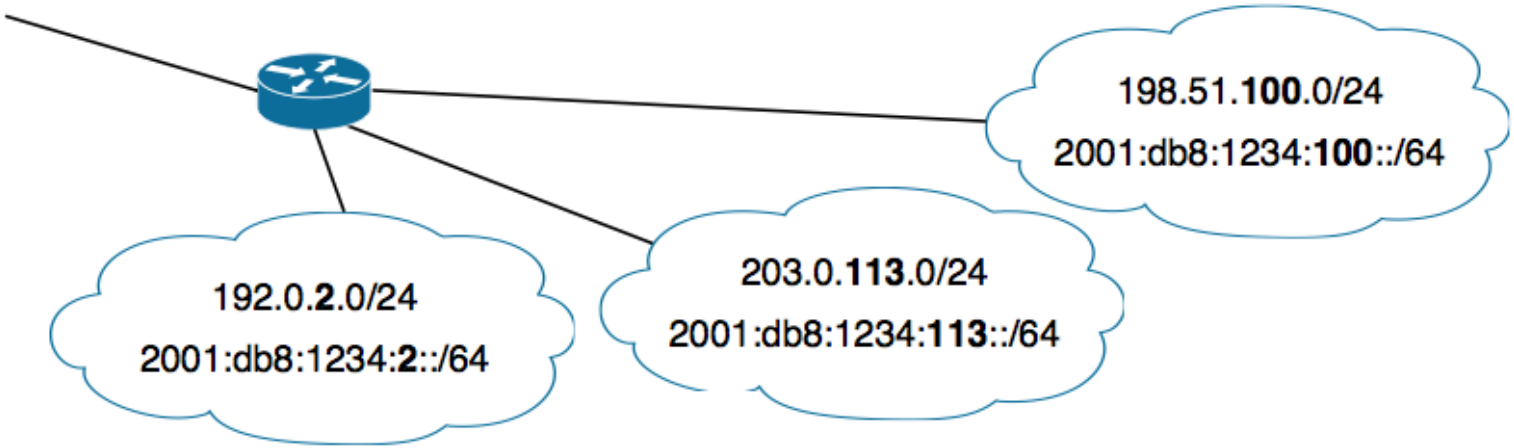

http://www.ripe.net/training/material/IPv6-for-LIRs-Training-Course/IPv6_addr_plan4.pdf

# Example adress plan input

### 3.2 Direct Link Between IPv4 and IPv6 Addresses

If the existing IPv4 networks use only /24 subnets (for example, from 203.0.113.0 to 203.0.113.255), a direct link can be established between IPv4 addresses and the new IPv6 addresses. In this case, you can include the penultimate number of the IPv4 address (113 in 203.0.113.0/24, for example) in the IPv6 subnet. The IPv6 address will then be 2001:db8:1234:113::/64.

Such an IPv4-to-IPv6 transition could appear as follows:




Easy and coupled with VLAN IDs it will work ☺

# Run IPv6 in production

Make sure you establish IPv6 in **production**

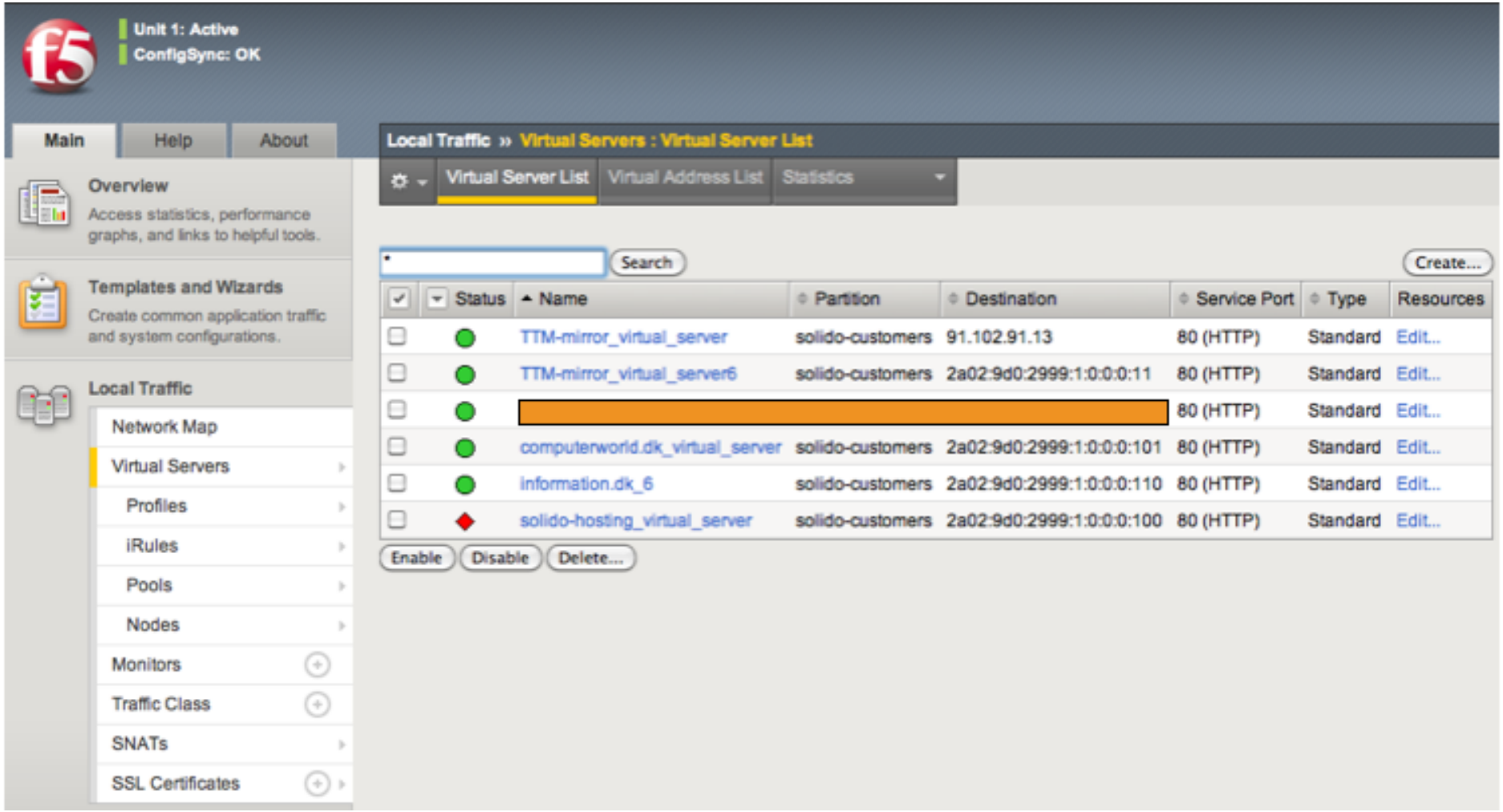
Enabling service on IPv6 without production - bad experience for users

Start by enabling your DNS servers for IPv6 - and DNSSEC - and DNS over TCP
Remember that your firewall might have problems with large DNS packets

Add a production IPv6 router - hardware device or generic server

Tunnels are OK, and SixXS consider their service production

# F5 load balancer example



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## About World IPv6 Day

On 8 June, 2011, Google, Facebook, Yahoo!, Akamai and Limelight Networks will be amongst some of the major organisations that will offer their content over IPv6 for a 24-hour ”test flight”. The goal of the Test Flight Day is to motivate organizations across the industry - Internet service providers, hardware makers, operating system vendors and web companies - to prepare their services for IPv6 to ensure a successful transition as IPv4 addresses run out.

Please join us for this test drive and help accelerate the momentum of IPv6 deployment.

`http://isoc.org/wp/worldipv6day/` and `http://test-ipv6.com/`

# IPv6 business case

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- An almost unlimited scalability with a very large IPv6 address space ($2^128$ addresses), enabling IP addresses to each and every device.
- Address self-configuration mechanisms, easing the deployment.
- Improved security and authentication features, such as mandatory IPSec capacities and the possibility to use of the address space to include encryption keys.
- Peer-to-peer connectivity, solving the NAT barrier with specific and permanent IP addresses for any device and/or user of the Internet.
- Mobility features, enabling a seamless connexion when moving from one access point to another access point on the Internet.
- Multi cast and any cast functionalities.
- IPv6 will provide an easier remote interaction with each and every device with a **direct integration to the Internet.** In other words, IPv6 will make possible to move from a network of servers, to a network of things.

Business case for IPv6 is **continuity**

Partial quote from http://www.smartipv6building.org/index.php/en/ipv6-potential

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# IPv6 is here already - use it

http://www.ipv6actnow.org/

http://digitaliser.dk/group/374895

http://www.ipv6tf.dk

# Up and running with IPv6

Use ping/ping6 and traceroute to test connectivity

Try in your browser:

- `http://www.kame.net` Dancing turtle
- `http://www.ripe.net` RIPE, look for address up right corner
- `http://loopsofzen.co.uk/` Play a game
- `https://www.sixxs.net/` Apply for IPv6 tunnel

Done ☺

# Questions?

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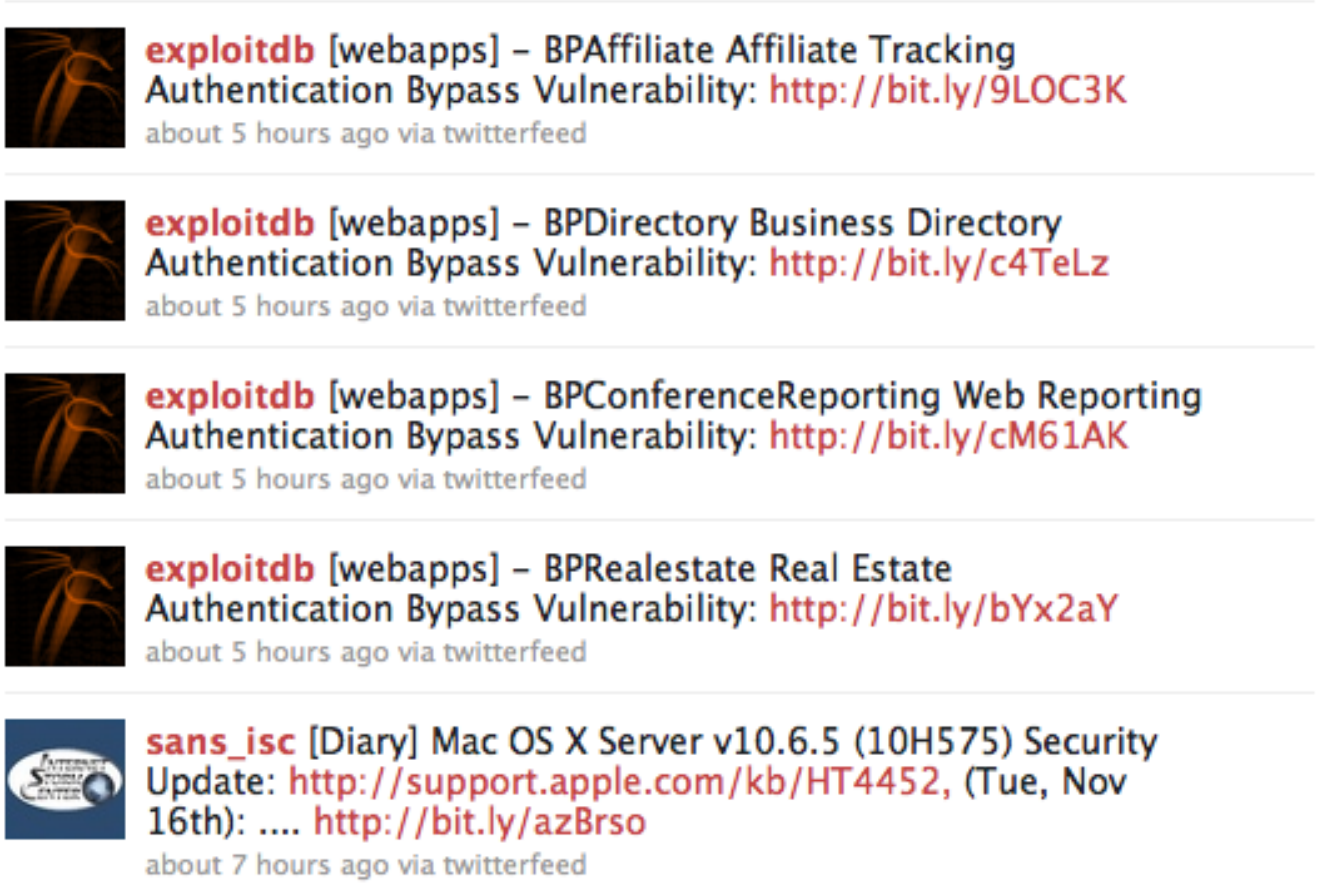
You are always welcome to send me questions later via email

# More Information




Twitter has become an important new ressource for lots of stuff

Twitter has replaced RSS for me

# Ressources

*Guidelines for the Secure Deployment of IPv6*, SP800-119, NIST
`http://csrc.nist.gov/publications/nistpubs/800-119/sp800-119.pdf`

*The Second Internet: Reinventing Computer Networks with IPv6*, Lawrence E. Hughes, October 2010,
`http://www.secondinternet.org/`

*IPv6 Network Administration* af David Malone og Niall Richard Murphy - god til real-life admins, typisk O'Reilly bog

*IPv6 Essentials* af Silvia Hagen, O'Reilly 2nd edition (May 17, 2006) god reference om emnet

*IPv6 Core Protocols Implementation* af Qing Li, Tatuya Jinmei og Keiichi Shima

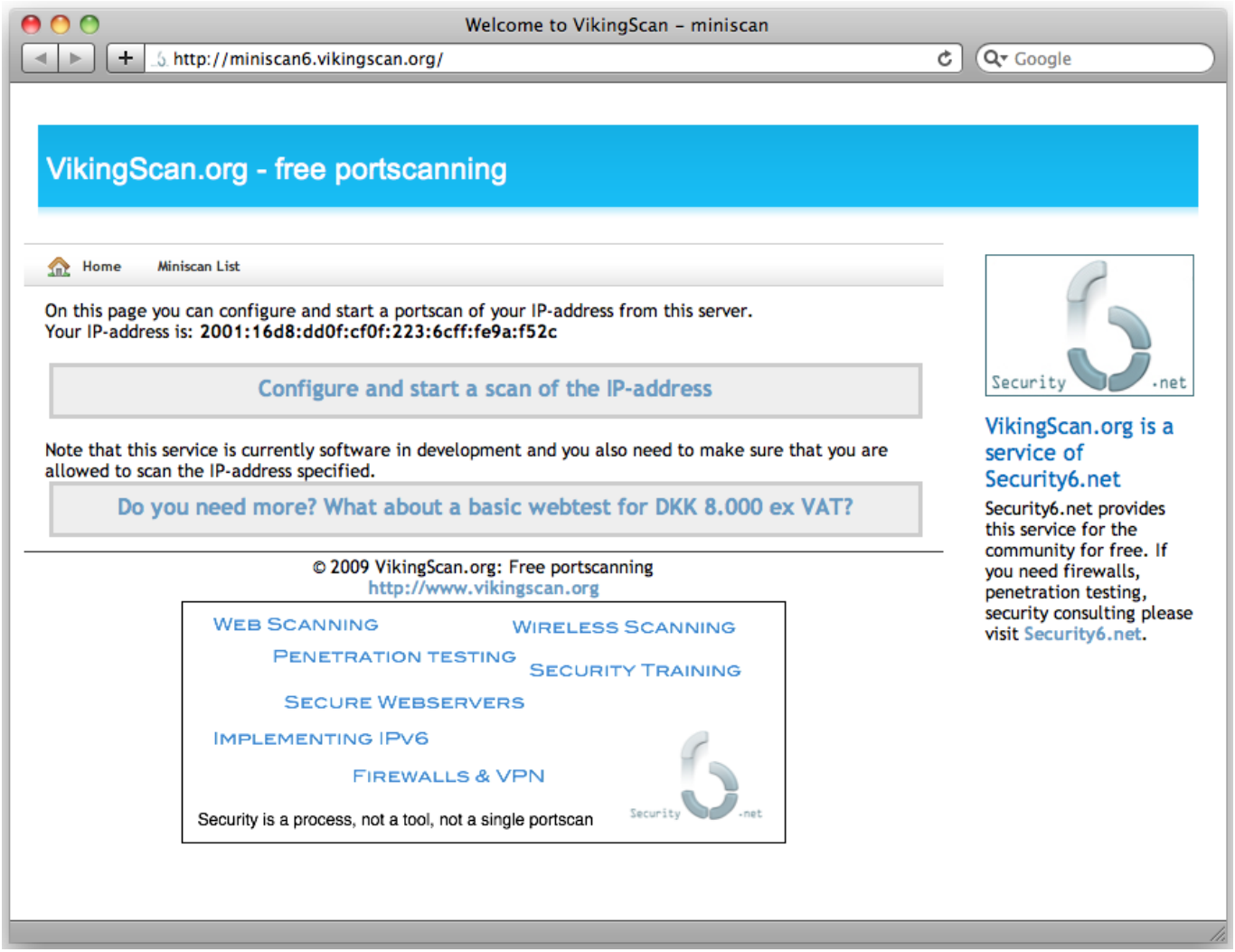
*IPv6 Advanced Protocols Implementation* af Qing Li, Jinmei Tatuya og Keiichi Shima

- flere andre

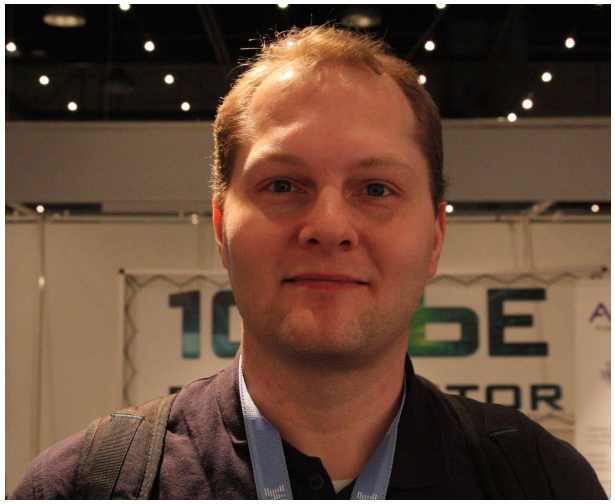
# Danish resources - get involved


Danish IPv6 task force - unofficial `http://www.ipv6tf.dk`

# VikingScan.org - free portscanning



# Contact information



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- 2003 - 2010 Independent security consultant
- 2010 - owner and partner in Solido Networks ApS