

# Norway: IPv6 World Leader?

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# Agenda

- 1) Quick introduction
- 2) Norwegian IPv6 deployment status
- 3) How to deploy IPv6 for online content
- 4) Questions/discussion

# Introduction

- Work with infrastructure administrator in Redpill Linpro
  - IP and storage networking, data centres, etc.
- Supports **Managed Services** (server and application operations)
- Tech lead for deploying IPv6 in our core network since 2008
- Have performed informal research in order to quantify the risks and benefits with deploying IPv6 on online content
  - <http://fud.no/ipv6>
  - Arranged a Norwegian predecessor for «*World IPv6 Day*»
- I try to promote IPv6 both nationally and internationally

# Norwegian IPv6 status (as far as I know...)

# The public sector

- There are some bright spots:
  - **NPT** has organised two IPv6 get-togethers with the business, and have published the report «Innføringen av IPv6 i Norge»
  - **DIFI** has considered «IPv6 som forvaltningstandard», and recommends that all acquisitions (hardware, software, IT services, ..) *should* support IPv6. Same for all new governmental web sites and portals. Note the word «should» - it is not (yet) a hard requirement.
  - **UNINETT** has IPv6 in its core network, which is used by several universities and university colleges, in particular student dorms in Oslo and Trondheim
- However, there's plenty of room for improvement
  - No public sector web sites or portals have IPv6 connectivity

# USA – an example worth following?

- **Executive order** to all federal agencies, signed Vivek Kundra, Federal Chief Information Officer in the Obama administration, September 2010:

*«In order to facilitate timely and effective IPv6 adoption, agencies shall:*

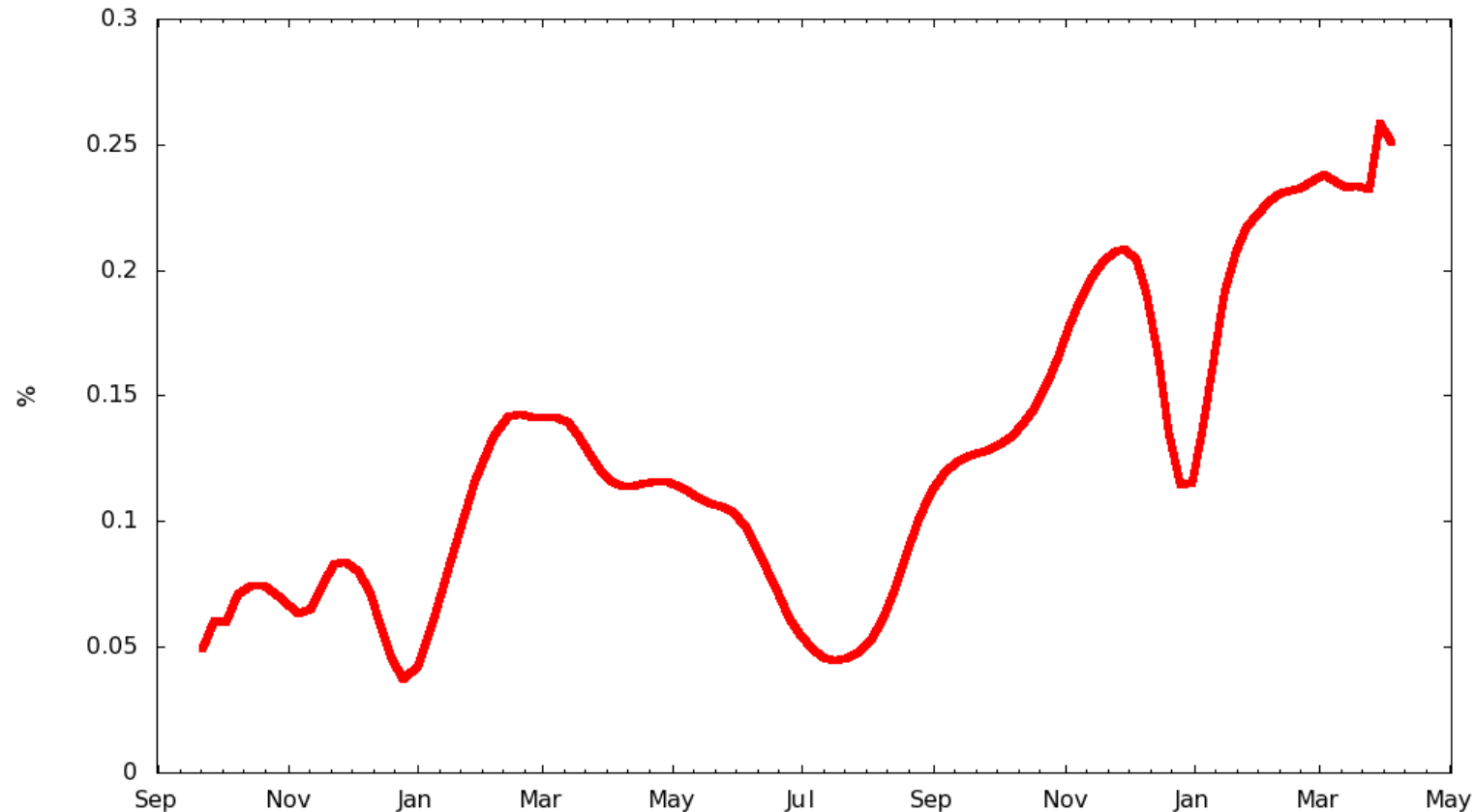
- *Upgrade public/external facing servers and services (e.g. web, email, DNS, ISP services, etc) to operationally use native IPv6 by [Sep 31] 2012;*
- *Upgrade internal client applications that communicate with public Internet servers and supporting enterprise networks to operationally use native IPv6 by [Sep 31] 2014;*

*[...]*

*The Federal IPv6 Task Force will meet with agencies to explain the Government's IPv6 direction and to share best practices. Attached is the schedule of the initial meetings, which will be followed by TechStat Accountability Sessions that will be led by the IPv6 Task Force to ensure a timely and successful transition to IPv6.»*

- **Ten** U.S. federal agencies are participating in World IPv6 day (so far)

# The end users



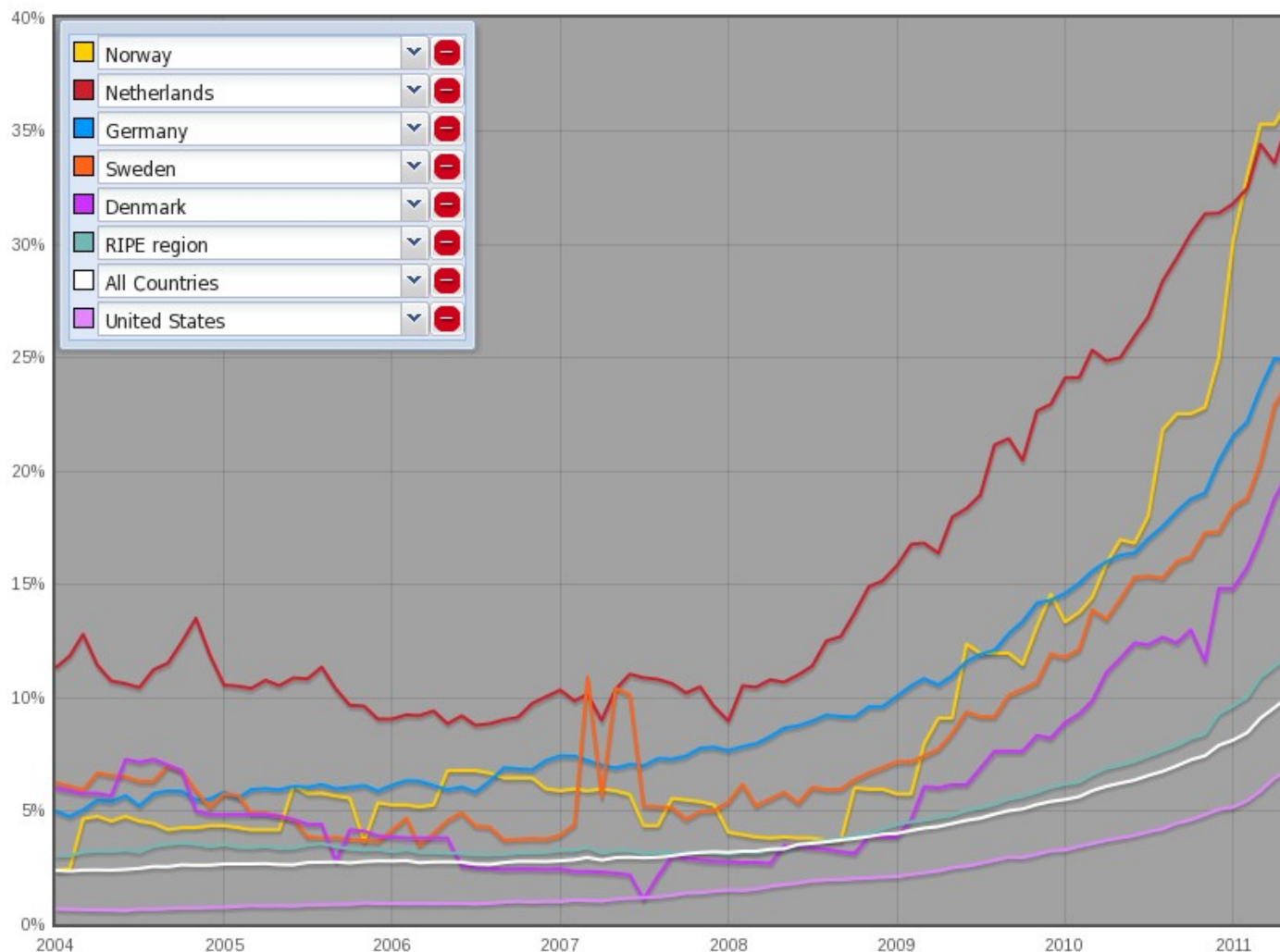
- Only approx. 1 of 400 Norwegian end users have IPv6 today
- Mostly University students and employees
- Christmas and summer holidays are therefore very visible

# The ISPs - today

- None of the larger ISPs are supplying IPv6 as a standard service
  - Some do if you know who to ask: Powertech, Ventelo, ...
- The enterprise market looks somewhat better
  - BKK provides IPv6 with SLA on all accesses by default
  - Pilot services available from several other providers
- No IPv6 available on the mobile broadband networks
  - NetCom and Telenor Mobil do not even have IPv6 in their core network - at least it's not visible in the global routing table
  - Chicken/egg problem: Lacklustre IPv6 support in telephones and 3G USB modem sticks
- Other countries are ahead of us - IPv6 is available from: Verizon Wireless (USA), Free (France), XS4ALL (The Netherlands), ...

# The ISPs – reading between the lines

- Most fixed-line broadband ISPs appear to be taking IPv6 seriously
  - Altibox is in the lead, saying deployment starts Q4 2011
  - Yesterday, Telenor said they'd start roll-out in 2013
  - Others are more reluctant to commit to specific dates
- I've not heard much from smaller ISPs in the country
  - The likely want to follow in the footsteps of the larger ones
- A positive exception to the rule:
  - Lynet, a small FTTH ISP in Oslo, is providing native IPv6
  - **Please** dig in to Nordre Åsen Kv. 1 BRL ASAP... :-)



- 35% of Norwegian **ASes** (ISPs and large organisations) have IPv6 in their core network - step 1 in any deployment project
- No other countries have more – Norway is the world leader! :-)

# The content providers

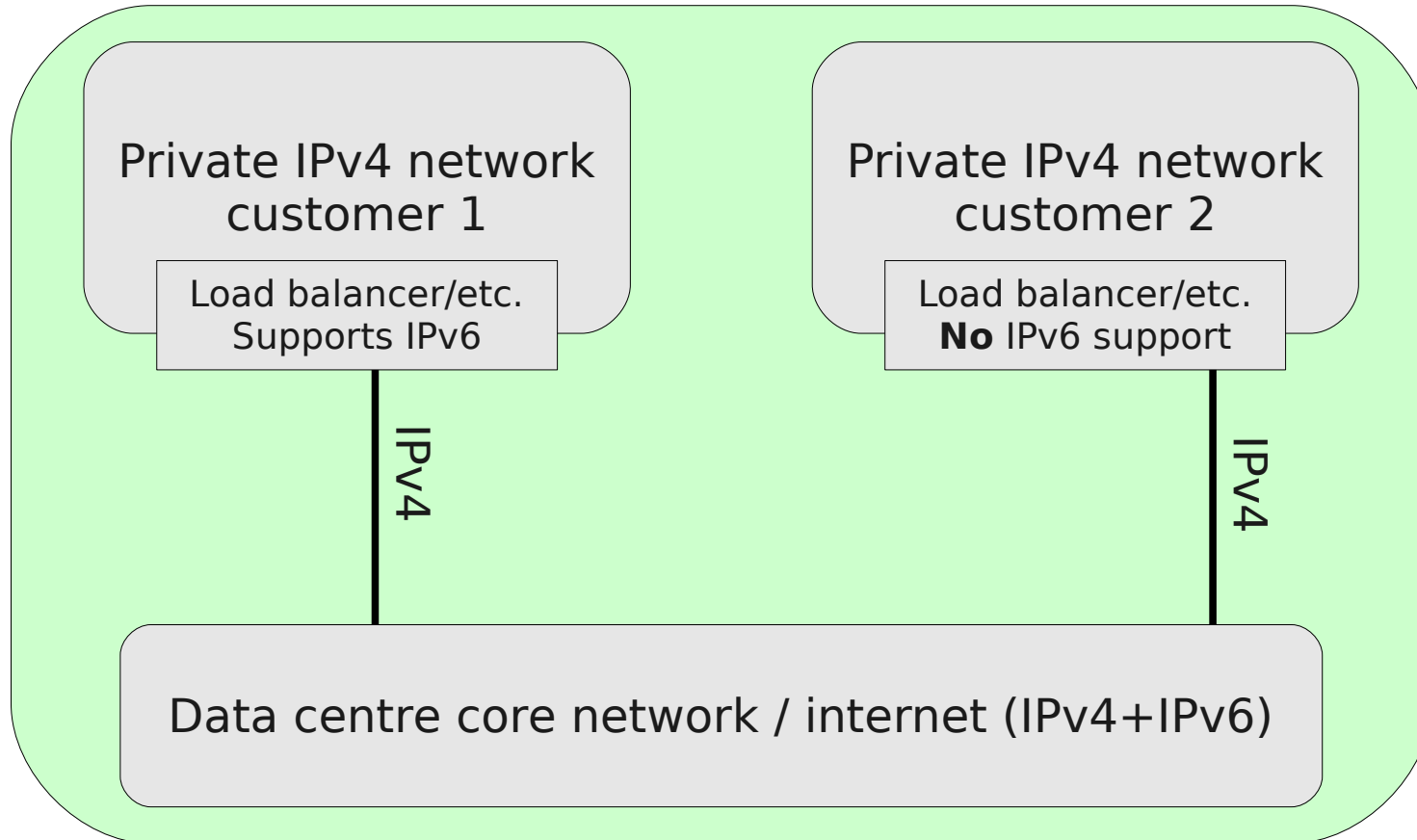
- A-pressen Digitale Medier and VG Nett have had IPv6 since 2010
- VG Nett is at the time of writing the largest web site in the world that is universally accessible over IPv6
- Norway is therefore the undisputed world leader when looking the amount of content consumed daily that is also IPv6 available
- Google and Facebook can enable IPv6 on a per-ISP basis
- Akamai and Limelight-hosted content can be easily IPv6 enabled
- There's therefore no longer any chicken and egg-problem between IPv6-enabled content and end users

# Others

- Very small focus on IPv6 in other Norwegian enterprises
  - Small businesses
  - Online banking
  - Industry
    - Statoil is maybe a positive exception?
- The Internet business must anyway lead the way
  - The biggest missing piece of the puzzle right now is IPv6-enabled end users

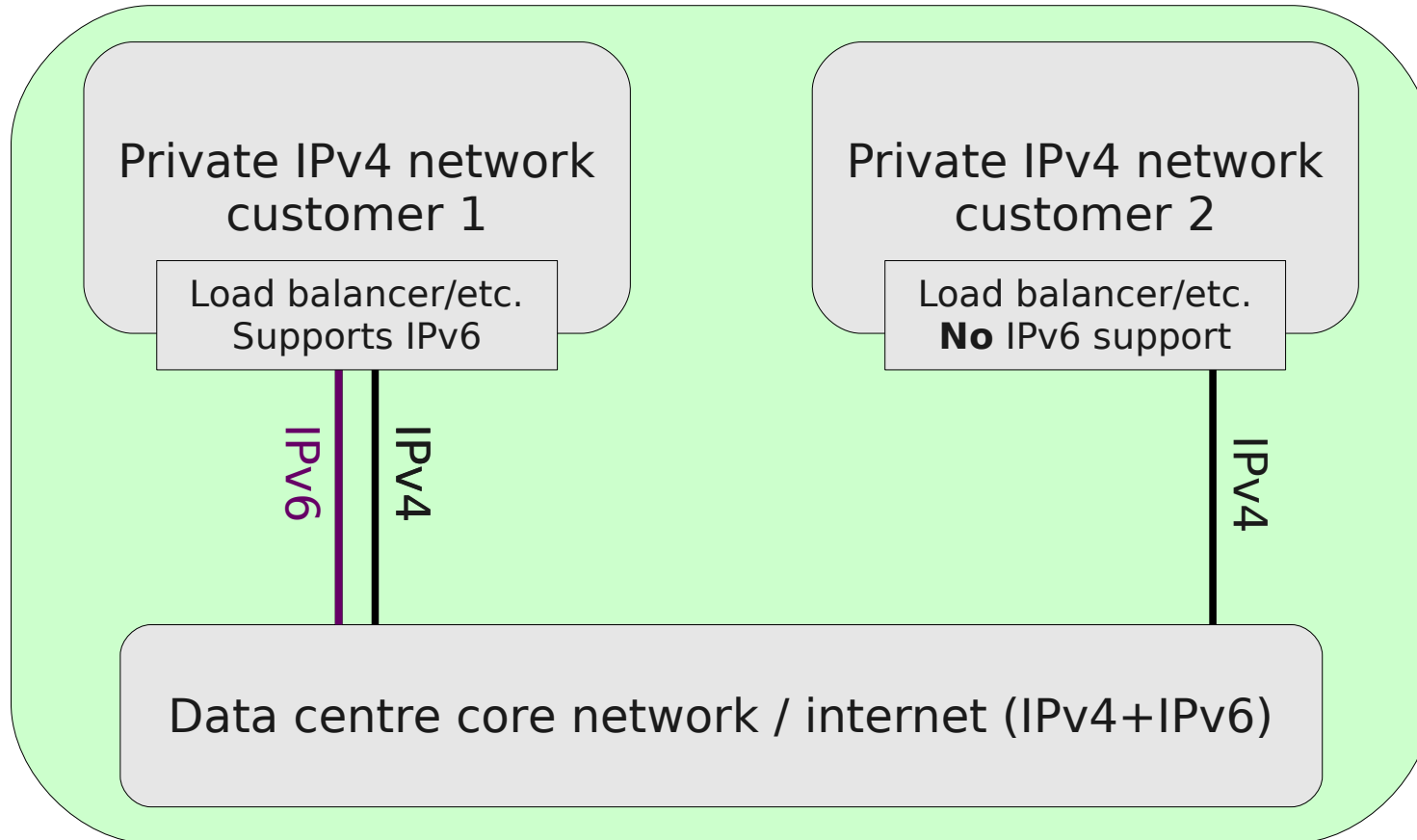
# How to deploy IPv6 for web content

# Typical RL data centre architecture



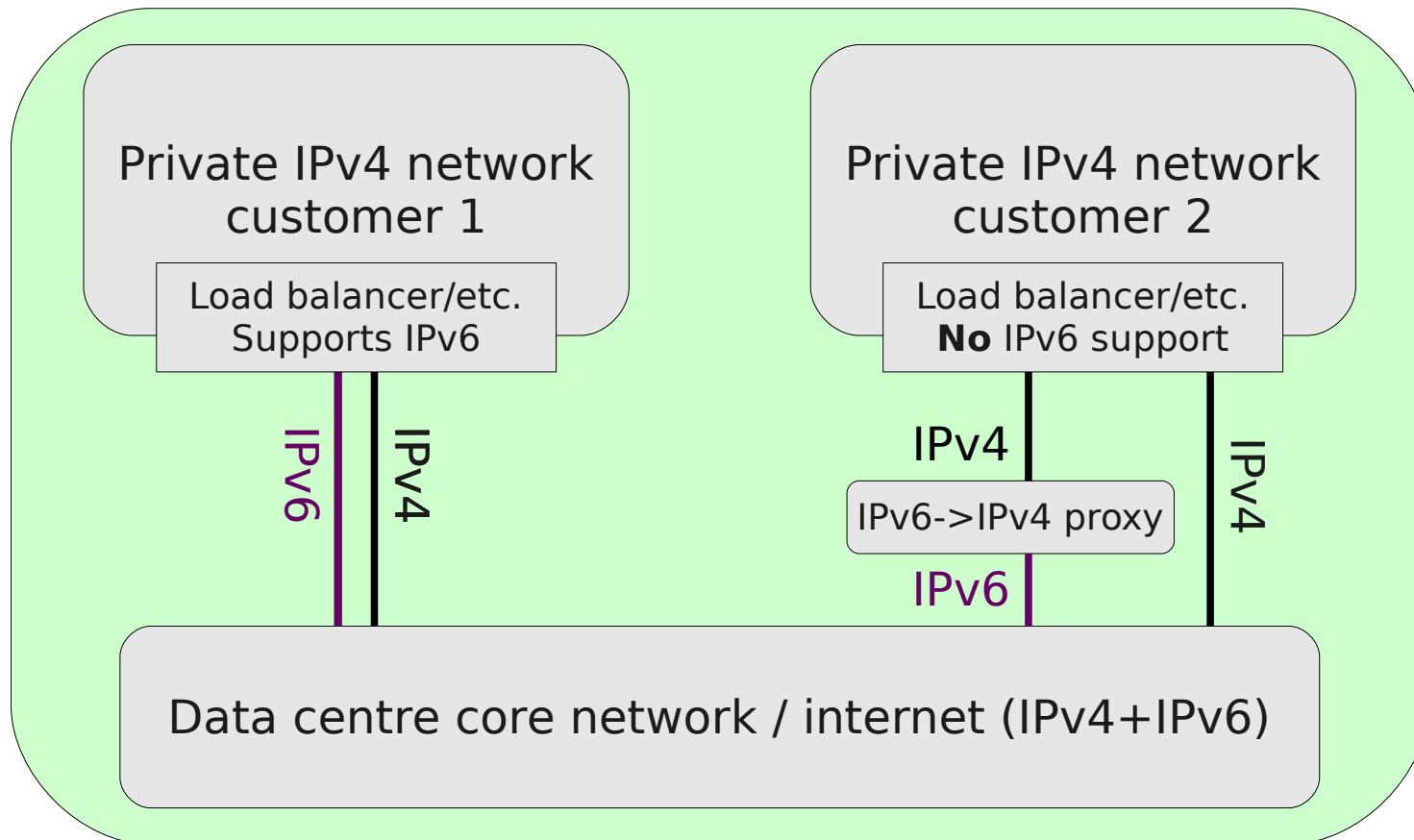
- Most of our customers have a dedicated backend network where their servers and internal services communicate
- A smaller frontend network houses the publically available frontend nodes (load balancers, web caches, web servers, etc)

# IPv6 to frontend for customer 1



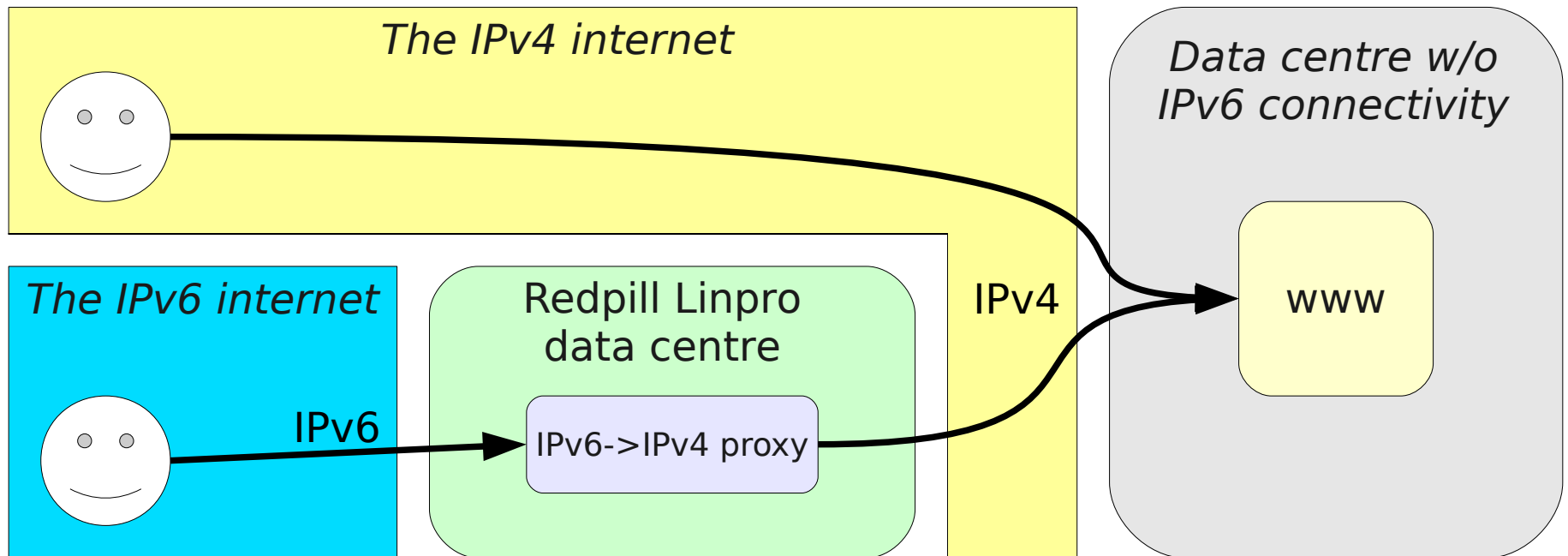
- 1) Enable IPv6 on the customer's uplink (can be the same cable)
- 2) Configure on customer's front end (load balancer or similar)
- 3) Publish the IPv6 addresses as AAAA records in DNS

# IPv6 via proxy for customer 2



- 1) Establish a IPv6->IPv4 proxy and route an IPv6-network to it
- 2) Configure it to proxy TCP (L4) or HTTP (L7) to IPv4
- 3) Publish the IPv6 addresses as AAAA records in DNS

# IPv6 via proxy for external cust.



- We can deliver IPv6->IPv4 proxying as a service for organisations locked in to data centres or providers that do not support IPv6
- It is important to ascertain that there is good connectivity between the proxy and the original IPv4 service in order to avoid a performance degradation due to latency increase

# Questions/discussion

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Thank you for your attention!