IPv6 in Belgium

History and Lessons Learned

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BOSA.be

Federale overheidsdienst
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Service public fédéral
Stratégie et Appui

.be

The pioneers

The pioneers

- 1998: Belnet (national research network) starts testing v6
- 2006-2009: AWT (Walloon telecom agency)
- 2010: Maehdros (small ISP)
- 2010: IPv6 usage in total still << 1 %

2011: The start of something new

- First IPv6 tests at federal government
  - In addition: IPv6 conference by FPS Economy
- Also first production in production
  - BIPT (telecom regulator) enables IPv6 on their website
  - A few small hosting providers and small ISPs provide IPv6
- IPv6.be website (Belnet), technical audience
- 1st IPv6 council
  - Informal meetup
  - Stakeholders from ISPs, government, universities …

Landscape

- Belgium: small country, densely cabled
- 3 major ISPs
  - 1 (formerly state-owned) nation-wide phone company
  - 2 regional cable companies (+ smaller one)
- Federal level: several different data centers
  - Similar situation on regional level

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2012: Preparing for takeoff

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The case for IPv6 (ISPs)

- Code of Conduct: restriction of Carrier-Grade NAT
  - Regulator, ISPs and law enforcement agencies
  - Max 16 users per IP-address + some other limits
- Need for more IP-addresses
  - Always-on broadband modems
  - Roadmap: mobile / IoT services

Ambitious start

- National plan supported by Council of Ministers
  - Especially by Economy / ICT
  - Stimulate IPv6 adoption by public AND private sector
- Kick-off event / press conference
- Free brochure for businesses and IT-suppliers
- One online investment bank enables IPv6

Early public services-related adopters

- Belnet (research network, government network)
- BIPT (regulator)
- Court of Audit
- Fedict (currently known as FPS BOSA DG DT)
- FPS Economy
- FPS Internal Affairs
- Smals (IT-services for Social Security)

2013

- Budget cuts at federal level, so focus on awareness
- Free (basic) IPv6 workshops for federal administrations
  - Organized by Belnet / Fedict
- Sharing experiences / plans with regions
  - Flanders Region enables IPv6 on their portal
- Two large ISPs starting rolling-out IPv6 on fixed line
  - Total IPv6 usage reaches almost 5% at the end of 2013
- Websites of large TV station, newspaper on IPv6 (CDN)

2014

- Another large ISPs starts massive roll-out
  - Total of IPv6 usage from 5% to almost 30% in 1 year
- Report on the results of the initial national IPv6 plan
- EC accepts (set of) IPv6 specifications as “identified technical specifications”
- Fedict recommendation IPv6-clause in public tenders
  - Not only for hardware, but also for software and services

Slow but steady progress

2015 - 2016

- A few more media sites using CDN, more academic sites
- Socialsecurity.be IPv6 enabled
- By the end of 2016: almost 50% IPv6 usage

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2017 - 2018

- Consolidation of many federal websites on same platform
- Gradually enabling IPv6 on larger federal websites
  - On edge of network, internal network stays IPv4
  - E.g. www.belgium.be, economie.fgov.be…
  - Result: +/- 30% (business hours) - 60% (holidays) IPv6
- Enabling IPv6 on smaller “key” websites
  - Monarchie.be, data.gov.be
- Mobile ISPs (finally) entering the game

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Current status

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Getting there

- Roll-out residential fixed line is a success
  - Limited only by lifespan of old modems
- Mobile is (finally) getting IPv6
- Media sites doing ok, but still work for content providers
  - A few larger newspapers and TV-stations use CDNs
- Public services and business are following

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Challenges remain largely unchanged

- IPv6 is still a “hard sell”
  - No real “end date” for IPv4
  - For many stakeholders: “just” business continuity
- Many suppliers/vendors still don’t know/care about IPv6
  - Hard to find experienced IPv6 engineers
  - Sometimes even surprised when asked to activate IPv6 as per contract

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Ongoing discussions and questions

- Provider Assigned vs Provider Independent range
- Legacy IPv4 addressing vs IPv6 addressing ?
  - Often some (legacy) hierarchy/structure is used, keep it ?

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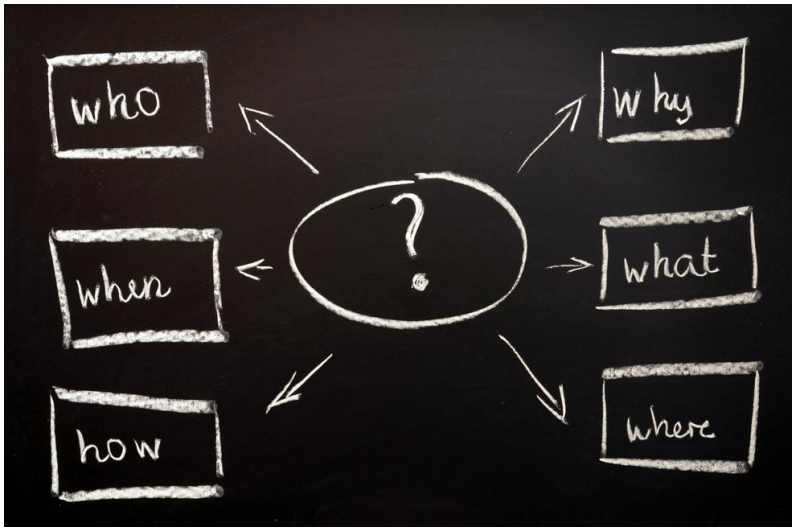
Lessons learned



What did not work

- Enable IPv6 on all federal websites by 2014
  - Budget cuts while new infrastructure was required
- Moving to IPv6-only datacenters in 2012/2014
  - Could work now
- Label or certification for equipment and services
  - Not enough resources within government itself
  - Free certification programs did exist for websites …
  - … but not for services or equipment
    - either not free, or legally hard to enforce/promote

Considered, but not implemented

- Specific campaign / website for citizens / SMEs
  - Most citizens / SME don't really care (nor should they)
  - Lots of technical info (ipv6.be etc) was already available
- Force ISPs to tell customers if they provide IPv6 or not
  - ISPs were doing a very good job anyway

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What did work

- Having (lots of) patience
  - Gradually replacing hardware and software
  - Still checking / asking suppliers to provide / enable IPv6
- Rather abstract paragraph in public tenders
  - "IPv6 must be equivalent to IPv4"
  - Avoids too much detail (changing technical specifications)
- Participation in IPv6 council meetings
  - Healthy competition + informal exchange of plans

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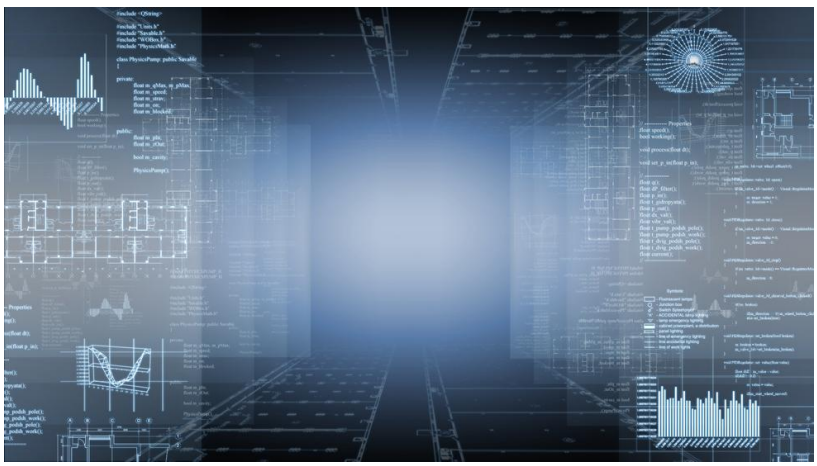
Don’t forget about…

- Configuration and monitoring of different flows
- Many software is IPv6-enabled by default (like it or not)
- Check your scripts (may not be able to process addresses)
- Websites are often not stand-alone
    - Think Javascripts for statistics, fancy fonts via CDN, CAPTCHA
    - Payment systems, other integrations

Future plans



Government level (and other content providers)

- Plan: provide IPv6 check as part of “website check-up”
  - Check TLS certs, cookies, accessibility, IPv6… in one overview
- Focus on non-website services
  - DNS / mail / internal web services
  - Office networks, reverse proxies
  - Authentication services

Thank you

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