IPv6-Kongress 2014

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Cinestar Metropolis, Frankfurt, Germany

An I.P.V. SixXS Overview

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SixXS

SixXS

SixXS is a small hobby project, grown a bit big, that provides a service for ISPs for a quick way of enabling their user base with IPv6.

Thanks to all the ISPs who are providing the PoPs, as without them it would not be possible to do this!

Just the two of us...

- **Jeroen Massar**

  Day-to-day running, SixXS v1, v2+ design, sixxsd, frontend, PuTTY, ecmh, *

  Btw, my first IPv6 prefix was 5f04:4f00:c0xx::something courtesy of SURFnet (RFC1897). The remote tunnel endpoint used was zesbot.ipv6.surfnet.nl which is still alive today.

  Work: Massar Networking

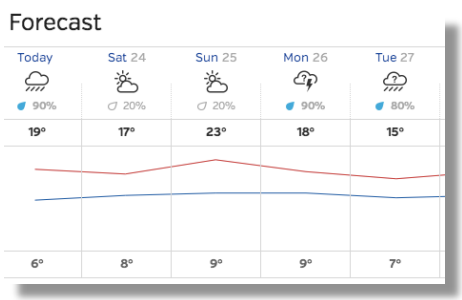
- **Pim van Pelt**

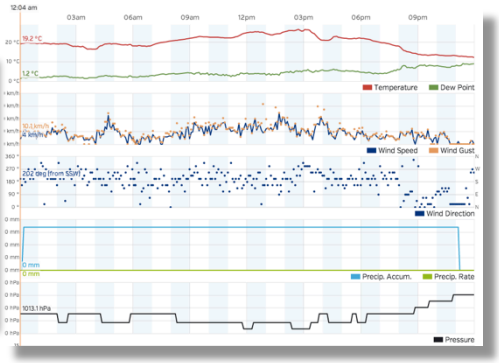
  Original IPng.nl project, SixXS v1 design, policy, more PoPs, whiskey!

  Work: Google

Why SixXS?

- **Didn't have a static IPv4 address at home, didn't have an IPv4 prefix either, everything behind NAT.**
- **IPv6 gave access from other locations with (tunneled) IPv6 to home (which had a tunnel).**
- **Can play IPv6Quake with friends without NAT issues.**
- **Watch the cows on the home cam.** **(RPi with a USB webcam on IPv6)**
- **Check the weather at home.**





Short History (1/1)

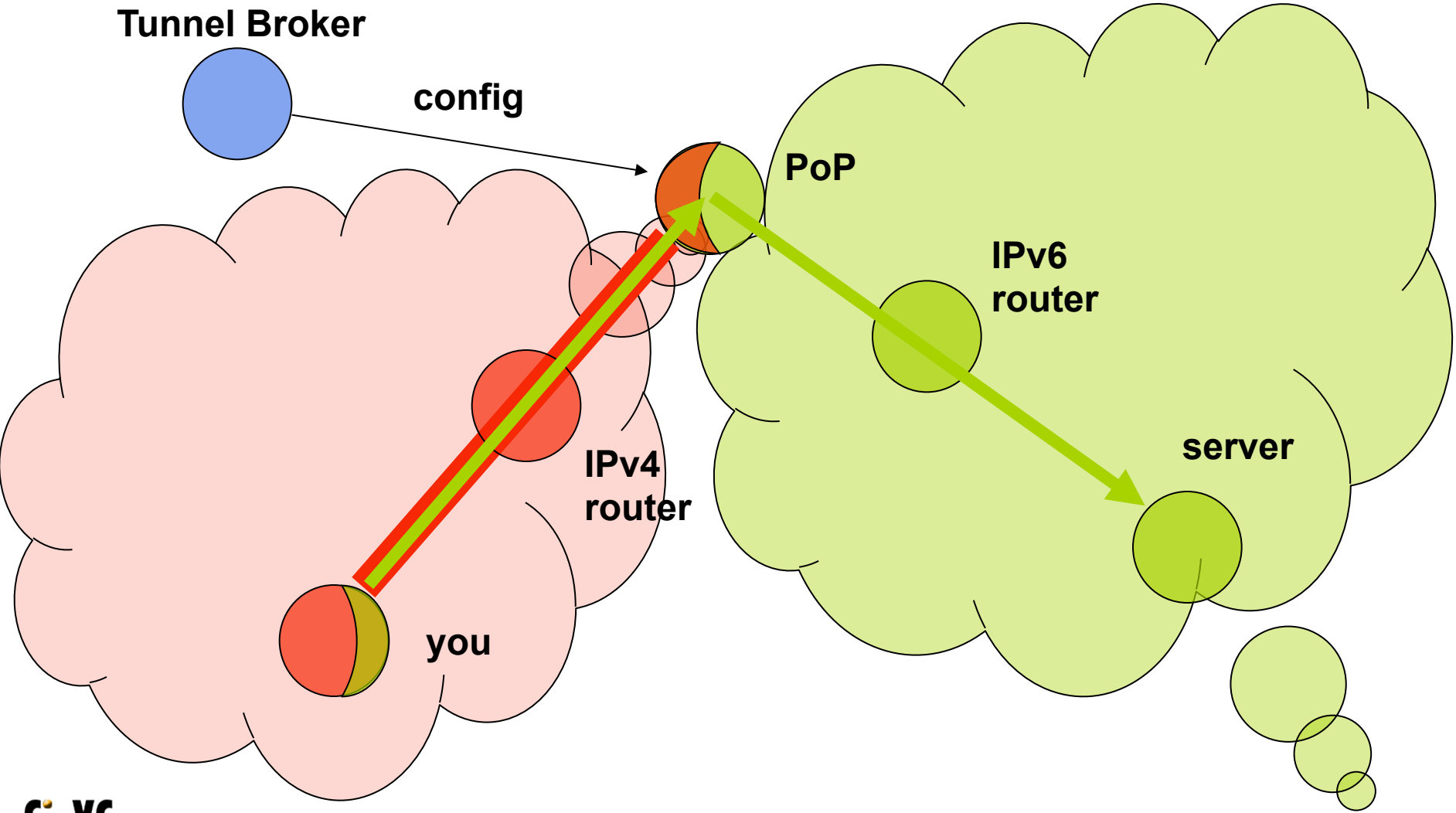
- **2000: Started in as IPng.nl with 1 PoP in Amsterdam.**
- **2002: Became SixXS as we provided the service for multiple ISPs, GRH launched.**
- **2003: Heartbeat, TIC, IPv6Gate.**
- **2004: AICCU, IPv4Gate.**
- **2005: USA, GRH Distributed Traceroute.**
- **2006: AYIYA support, 6bone shutdown.**
- **2007: New Zealand, Wiki, BitTorrent Tracker.**
- **2008: IPv6 DNS Glue, DNSSEC, 10k+ users**

https://www.sixxs.net/news/

Short History (2/2)

- **2009: -SIXXS handles, NTP service, Google-over-IPv6**
- **2010: Brazil!, per-tunnel TIC password**
- **2011: Alaska, Czech Republic, Greece, Hungary, New Caledonia, Russia + sixxsd v4 beta**
- **2012: sixxsd v4 everywhere, Vietnam, Live Tunnel Status, 10 years SixXS**
- **2013: 35k active users, TIC STARTTLS, real SSL cert**
- **2014: maybe finally new AICCU? ☺**

RFC3053 – IPv6 Tunnel Broker

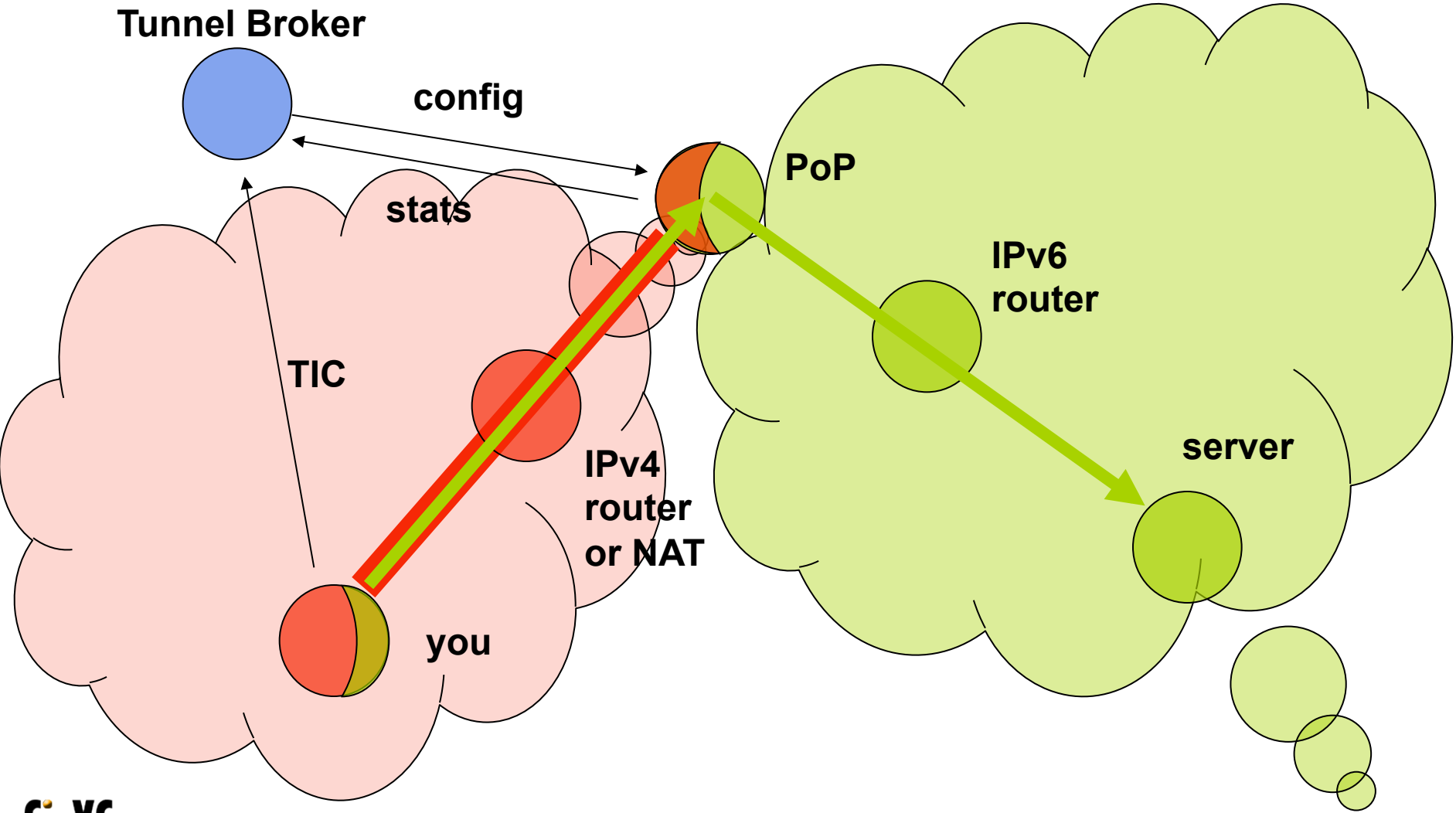


Protocol 41

- **Protocol 41 = IPv6**
- **It specifies how to put an IPv6 packet inside IPv4.**
- **Protocol 41 is static only.**
- **Protocol 41 doesn't cross NATs.**

https://www.sixxs.net/faq/connectivity/?faq=comparison

SixXS Tunnel Broker



Heartbeat

- **Dynamic/non-24/7 IPv4 endpoints.**
- **Proto-41 is static. The moment the user unplugs, another user can get that IPv4 address. That user then gets proto-41 packets and the firewall tool beeps with warnings, which sometimes results in abuse reports because we are attacking them.**
- **Allows one to move around proto-41 tunnels automatically or enable/disable them on the fly.**

AYIYA – Anything in Anything

- **Proto-41 tunnels can't cross NATs.**
- **Proto-41 tunnels are not authenticated.**

  (read: one can spoof them easily)
- **Heartbeat runs next-to the proto-41 tunnel. Heartbeat might work, proto-41 might not.**

AYIYA solves these issues by tunneling IPv6 inside IPv4/UDP and signing these packets.

AICCU

Automatic IPv6 Connectivity Client Utility

- **Proto-41, heartbeat and AYIYA tunnels.**
- **Simple “Test” mode for diagnosing common issues, testing at least that the basics work (or not).**
- **Windows, Linux, *BSD, OSX, AIX, Solaris, etc**

Still in the pipeline:

- **Comprehensive “test” mode.**
- **GUI/Web-interface for all platforms.**

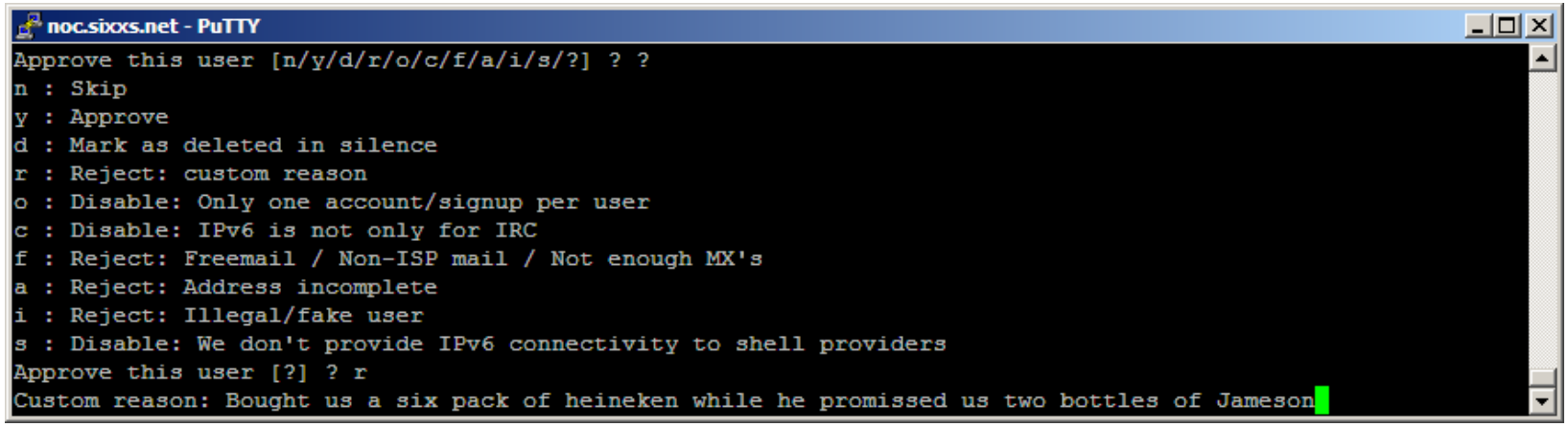
CPEs / Mobiles

- **AVM Fritz!Box has native heartbeat support.**
- **Heartbeat support per TCL on Cisco.**
- **Various vendors (Draytek, ZyXEL, Motorola, etc) include AICCU out-of-the-box with a little UI interface to configure it.**
- **Most Linux-ish distributions have it (DD-WRT, Debians, Redhats etc)**
- **Two Android apps: IPv6Droid + Androiccu.**

  (IOS VPN API is only available under NDA… hence no support there yet)
- **AYIYA is great for mobile devices (laptop/phone)**

Reviewing

- **All requests are reviewed by humans (read: me).**
- **As most faulty requests have similar things wrong we have a standard list of rejections, thus don't be offended when you get rejected, it is not only you…**
- **We reject in hope to receive clarification from the user why something looks odd.**



Abuse and ISK

- **We require proper details, as effectively we become the IPv6 ISP for the user.**
- **We need these for abuse handling.**
- **People are less inclined to do bad things when their details are known -> kept SixXS possible!**
- **ISK is our Credit system, it keeps people interested in keeping their tunnel up, and it avoids people who are ‘bad’ from wasting resources.**
- **We once accepted XING/LinkedIN for bonus credit allowing getting a /48 subnet, useful when using a router (eg Fritz!Box). We do not anymore as default subnets exist to solve that problem.**

The SixXS Daemon

- **Linux/*BSD kernels not made for 2k+ interfaces (tunnels), both randomly lost routes and even tunnel interfaces or endpoints.**
- **sixxsd has a single ‘tun’ interface, we route /40s into that** (yup, 5x /40s on deham01 + dedus01 go into it ;)
- **Handles tunnel encap/decap for proto-41 & AYIYA.**
- **Lookup of tunnels without tree: we know the IPv6 address and structure**
- **Handles stats (traffic count, latency test etc)**
- **Tunnel prefix + 0x8000 = default routed subnet**

https://www.sixxs.net/faq/sixxs/?faq=sixxsd

Prefixes

- **Tunnel Prefix:**
  - **2001:db8:1000:0abc::/64**
  - **::1 = PoP, ::2 = you**
- **Default Routed Subnet Prefix:**
  - **2001:db8:1000:8abc::/64**
  - **Routed towards 2001:db8:1234:0abc::2**
- **Full Subnet**
  - **2001:db8:1234::/48**
  - **Routed towards 2001:db8:1234:0abc::2**

IPv6Gate

Allows access to any IPv4 website over IPv6 from IPv6-only hosts:

http://www.heise.de.sixxs.org

Also allows the reverse: IPv6-only site from IPv4-only host:

http://www.kame.net.ipv4.sixxs.org

HTTP only; no automatic clients/torrents allowed

More details https://www.sixxs.net/tools/gateway/

RFC4193 - ULA

IPv6 ULA (Unique Local Address)

RFC4193 Registration

- **fd00::/8 ULA Locally Assigned.**
  It is Unique, but maybe not Unique enough as it has a chance that it is not.
- **fc00::/8 ULA "Registered" – not specified**
  and thus can't be used.
- **Nearly 200 registrations**
- **Of course not guaranteed, when people don't check this list it can't be.**

https://www.sixxs.net/tools/grh/ula/

GRH – Ghost Route Hunter

- **Peers actively with over 150 ISPs around the world.**
- **A tool for detecting and hunting down Ghost Routes in the IPv6 routing tables and displaying DFP availability.**
- **Distributed Looking Glass**
- **Missing Prefixes**
- **Prefix Comparison**

https://www.sixxs.net/tools/grh/ula/

Future / Wish list

- More Multicast
  - Need to integrate ecmh into sixxsd
- AYIYA/DNS, AYIYA/HTTP(S), AYIYA/crypted
- New AICCU client
  - Need time to finalize / properly test
- Fix DNSSEC support
- BGP Support / Multi-PoP Tunnels
- Updated signup procedure
- User-Detail-changing through website

http://www.sixxs.net/about/technology/

The Numbers

- **44 PoPs in 28 countries**
  (be,br,cz,dk,ee,fo,fi,fr,de,gr, hu,ie,it,lu,nl,nc,nz,no,pl,ru,si, se,ch,uk,us,vn)
- **41k+ *active* users (35% .de)**
- **42k+ *active* tunnels**

  (10k static, 12k heartbeat, 20k AYIYA)
- **13k+ /48 subnets**
- **1 Gbit/s avg traffic**
- **2 Gbit/s peak traffic**

https://www.sixxs.net/pops/
https://www.sixxs.net/misc/usage/
https://www.sixxs.net/misc/traffic/

One last thing...

- **Thanks Concepts ICT, now part of KPN, for hosting the central SixXS systems for twelve years!**
- **For security and safety, these functions are now hosted on our own, Pim+Jeroen's, hardware in a redundant system & network inside Deltalis's datacenter-bunker. With many thanks to Deltalis and IP-Max for having us there.**

Questions?

Jeroen Massar

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http://www.sixxs.net/

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