

IPv6 *only* hosting at datacenter^{light}

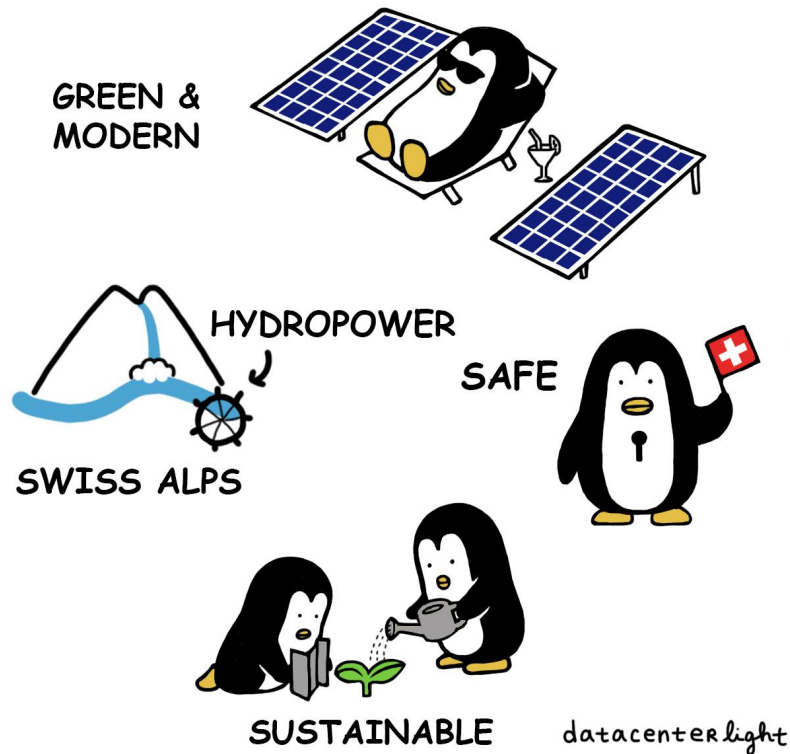


About Nico Schottelius

- Working & hacking in IT since 1998
- Build first IPv6 only ChaosVPN in Germany around 2000
- CEO of ungleich glarus ag since 2017
- MSc Computer Science (Focus Information Security) from ETH Zurich

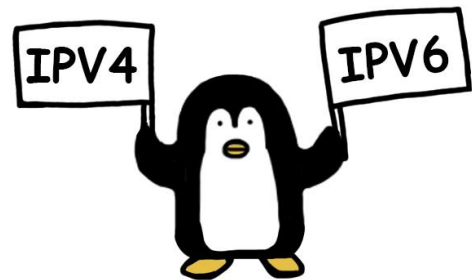
Data Center Light (www.datacenterlight.ch)

- Reuse of old factory halls
 - Don't build new, don't tear down
- Passively cooled
 - Low density
 - Supported by **thick** walls
- Powered by hydropower
 - From the **on site power plant**
- 100% Open Source
- 100% IPv6
- Main product: (managed) VM Hosting



Starting in 2017: IPv4, IPv6 or Dual stack?

- Starting position
 - RIPE LIR with a /22 (1024 IPv4 addresses) for starting
- Objective
 - Grow towards thousands of VMs
- Options
 - Focus on IPv6
 - Buy more IPv4 on the market

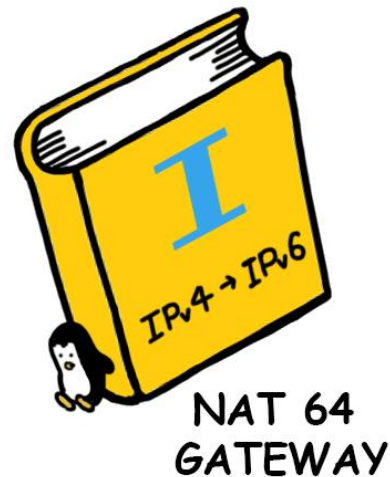


**Building a data center on IPv4
is like building a diesel car.
It works, it sells,
but it really is not sexy.**



Stage 1 setup: the nice & naïve approach

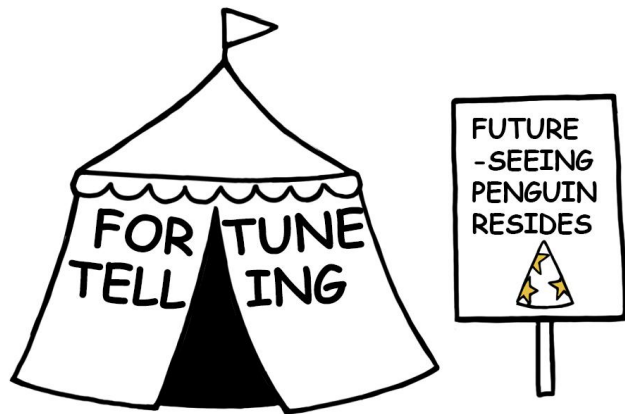
- IPv6 only
- Add IPv4 via NAT64 on border routers
- Use NAT64 in both directions
 - outgoing: mapping to our prefix
 - incoming: mapping to servers/VMs



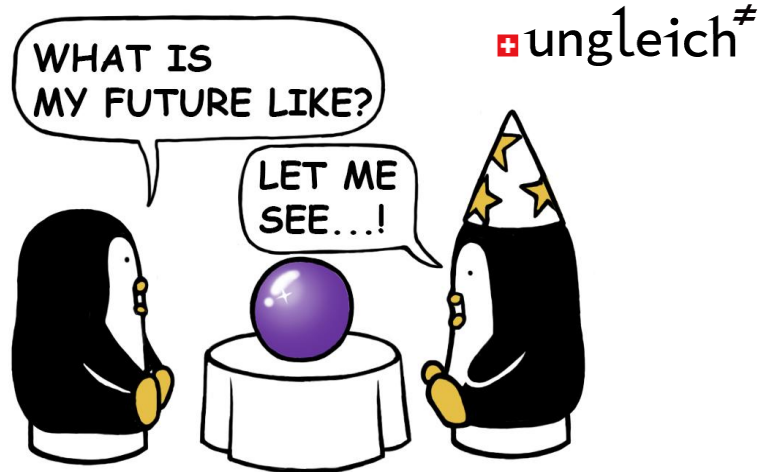
Stage 1 challenges (2017)

- Services binding only to 0.0.0.0 fail
 - Most can be changed
 - Some can't
 - Binding to 0.0.0.0 works, IF you have a loopback interface...!
 - Using proxies like nginx/haproxy to work around this
- Some services have hard coded (!!!) IPv4 addresses
 - DNS64 is never used
 - Completely breaks all assumptions
- Minor (outdated) software problems
- Would have been too good to be true...!

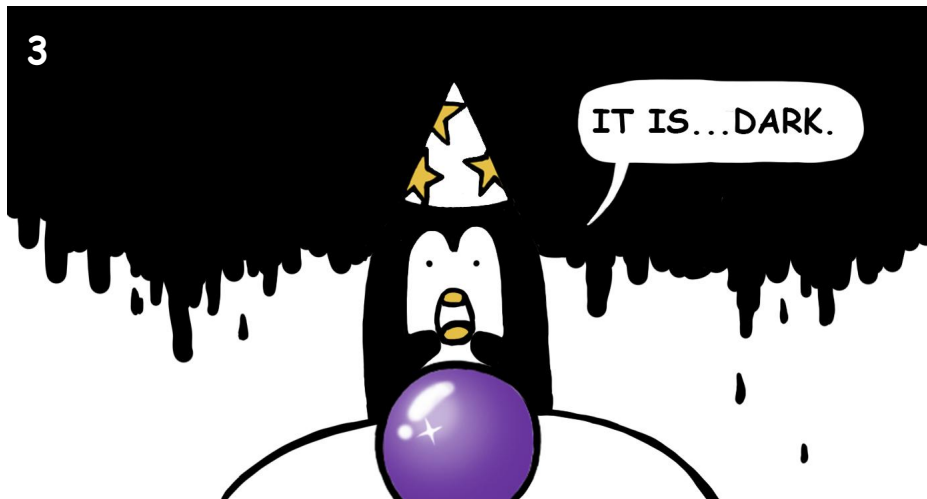
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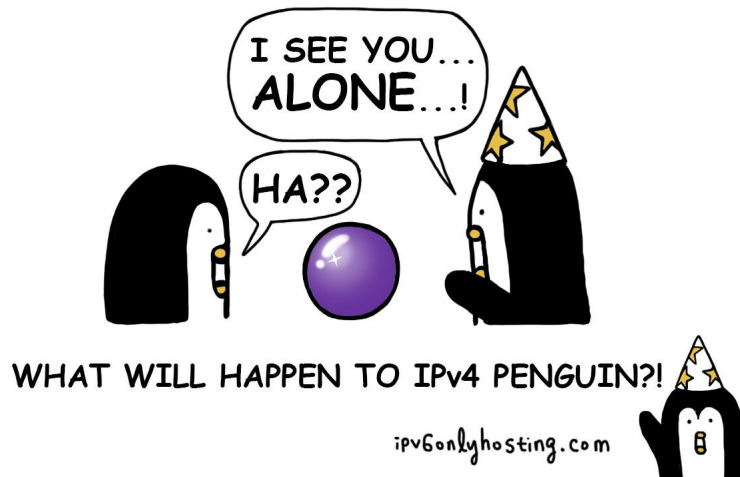
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3



4



Stage 2: Make life easy for customers (2018)

- Most customers liked our stage 1 approach
- However: some customers did not understand it at all
- Changing VMs: all dual stack
- Only hardware with IPv4: routers
- Switches, servers, storage: IPv6 only



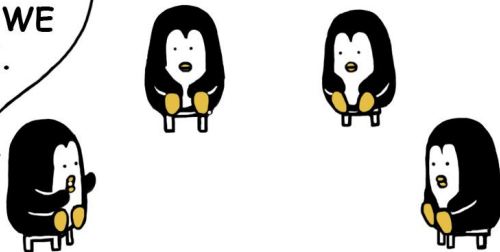
Stage 2 challenges

- Changing to PXE/Netboot
 - Some firmware does not support DHCPv6
 - Introduce separate boot network
 - After booting up, the operating system only acquires IPv6
- Dualstack VMs: IPv4 scarcity bites us
 - Strong tension between sales & infrastructure operators
- How to continue?

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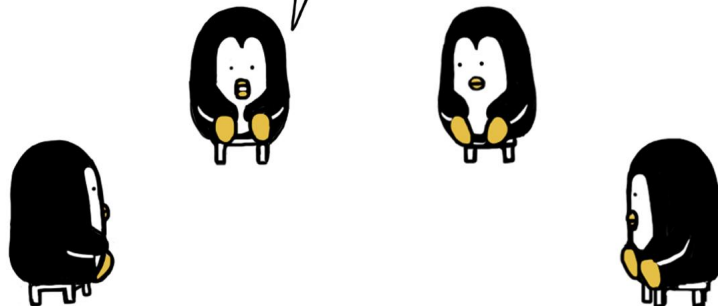
IPv4 ANONYMOUS

THIS IS A SAFE PLACE
TO SHARE WHAT WE
HAVE. I'LL START.
I HAVE..
I HAVE NAT.



2

I HAVE...
TRIPLE NAT.



ungleich[≠]

3

...



...IT'S OKAY.
LET IT OUT.



4

I DO...
PORT FORWARDING...

GASP



EVERYBODY PLEASE...
NO JUDGEMENT!!



OH BOY..

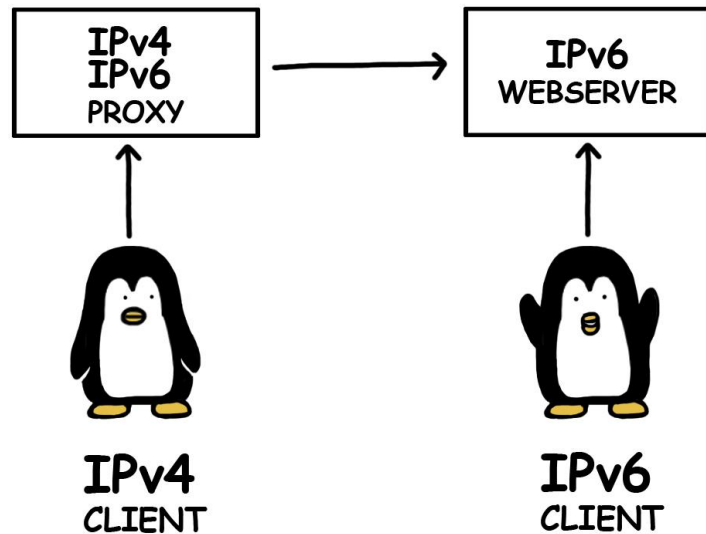
THESE PENGUINS NEED IPv6.

ipV6onlyhosting.com



Stage 3: IPv6 only experience (2018)

- Launched <https://ipv6onlyhosting.com>
 - No incoming NAT64
 - Only reachable by IPv6
- IPv6 networking
 - 1 IPv6 address by default
 - 1 /64 per VM on request
- IPv6 VPN
 - 1 /48 per tunnel
 - Used world wide (CH,US,KR,CN,DE,...)

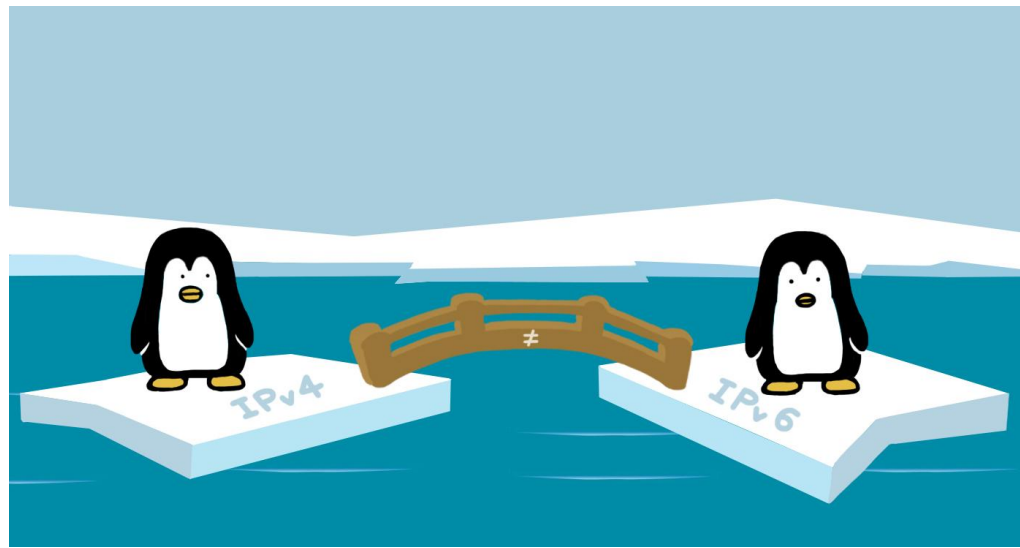


Stage 4: IPv6 on steroids (2019/2020)

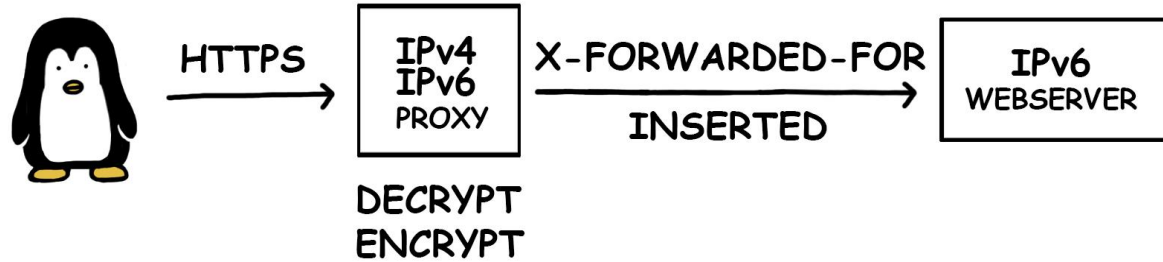
- Remove IPv4 netboot (done)
- Remove IPv4 on VMs (in progress)
- Add IPv6 routing per VM (in progress)
- Infrastructure offers layer 7 IPv4 translations (partially done)
- Open Source IPv6 first cloud stack (in progress)

Smart NAT64

- Static 1:1 mappings are not helpful
- Need to have 1:n mappings
- Introducing: proxy based IPv4
 - http proxy: ok
 - https (!) proxy: ok
 - smtp “proxy”: ok
 - dns “proxy”: ok
 - ssh “proxy”: ok
 - Smart layer7 - Layer 3 http(s) proxy

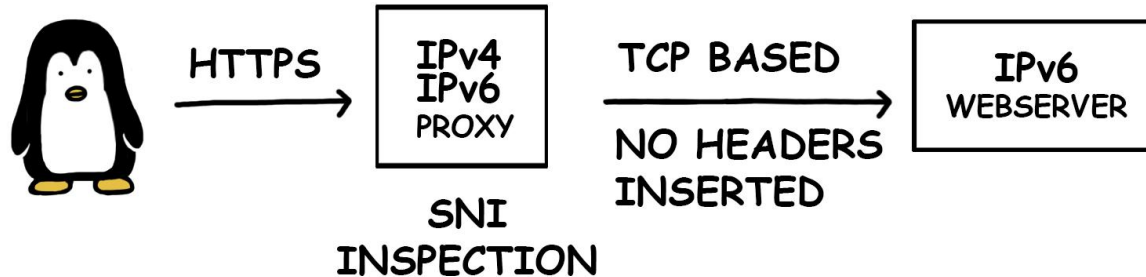


HTTPS (V1:OPENNING UP)



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HTTPS (V2:TCP)



ipv6onlyhosting.com

IPv6 Fun: IPv6 VPNs

- ping6 **nico.ungleich.cloud**
- Same IPv6 address anywhere in the world → “mobile IPv6”
- Carrying a /48 on the notebook
- Instant IPv6 enabler for networks (advertise a /64 on wifi)

More of this?

- Drop us a line at ipv6@ungleich.ch
- Chat about IPv6 at <https://IPv6.chat>
- Hack on IPv6 @ Hack4Glarus: <https://hack4glarus.ch> (20191129 .. 20191201)
- Write about IPv6 on <https://IPv6.blog>
- Work IPv6 only at <https://IPv6.work>

THIS PENGUIN NEEDS IPV6.

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