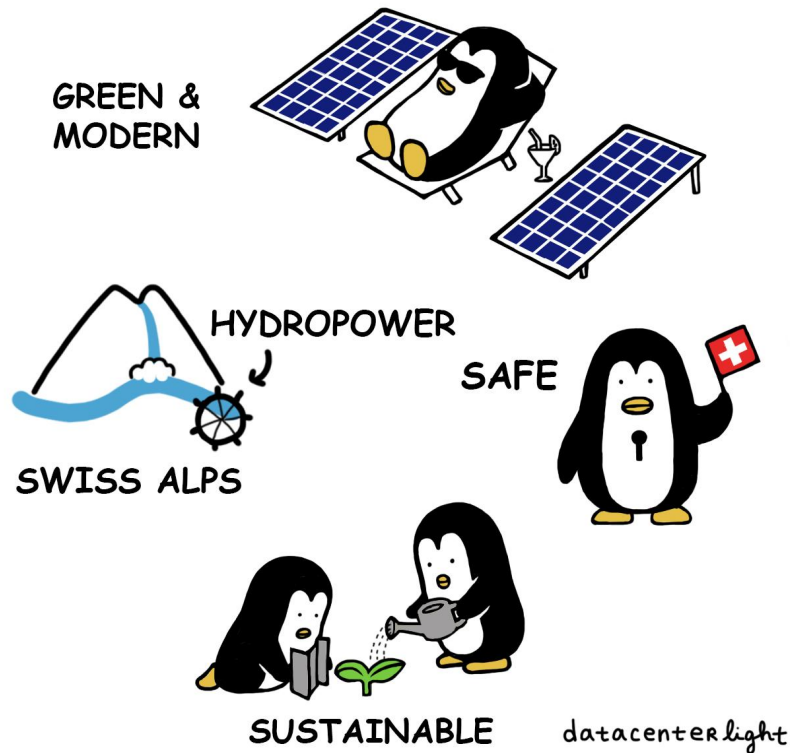


How to build, maintain & market IPv6-only datacenter



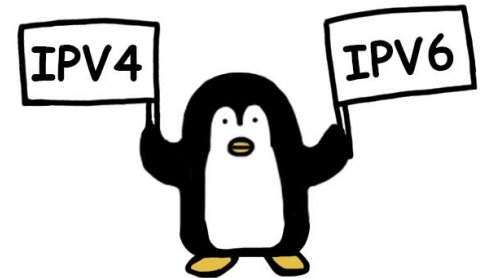
IPv6OnlyHosting.com in a box

- **100% IPv6**
 - No device without IPv6
- **100% Open Source**
 - Everything publicly auditable
- **100% renewable energy**
 - Using on site hydro power plant
- **0% cooling energy**
 - Low density passive cooling



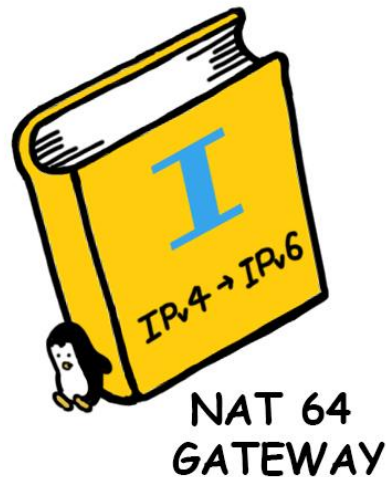
Starting in 2017: IPv4, IPv6 or Dual stack?

- 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



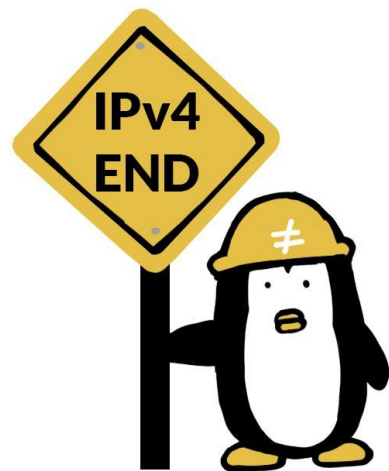
Stage 1 setup: the nice & naïve approach

- IPv6 only
- Add IPv4 via NAT64 on border routers
- Use DNS64 in both directions
 - outgoing: mapping to our prefix
 - incoming: mapping to servers/VMs

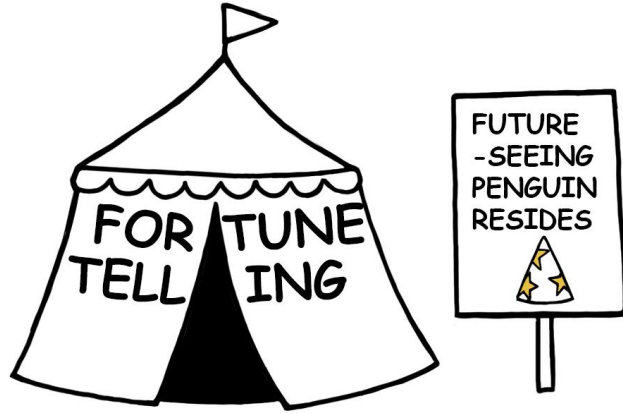


Stage 1 challenges

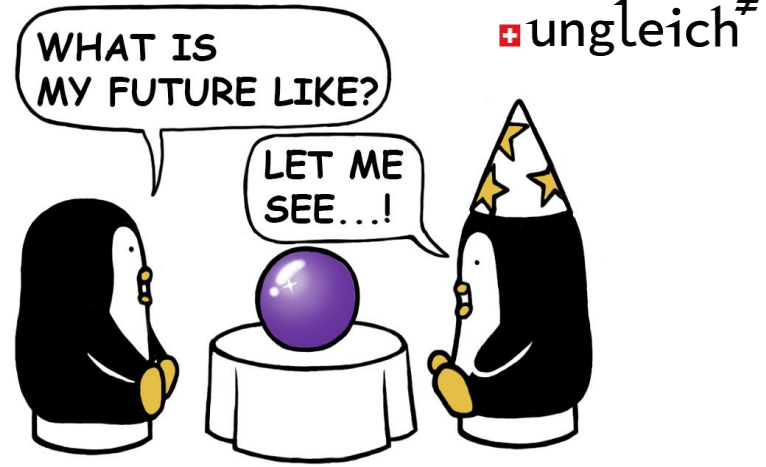
- Services binding only to 0.0.0.0 fail
 - Most can be changed
 - Some can't
 - Binding to 0.0.0.0 works, IF you have a loopback interface...!
 - Using proxies like nginx/haproxy to work around this
- Some services have hard coded (!!!) IPv4 addresses
 - DNS64 is never used
 - Completely breaks all assumptions
- Minor (outdated) software problems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



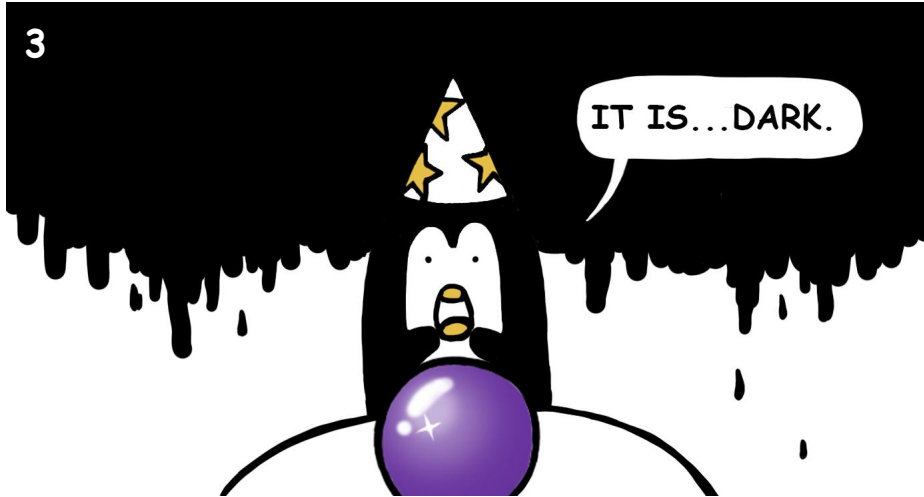
1



2



3



4



Stage 2: Make life easy for customers

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



Stage 2 challenges

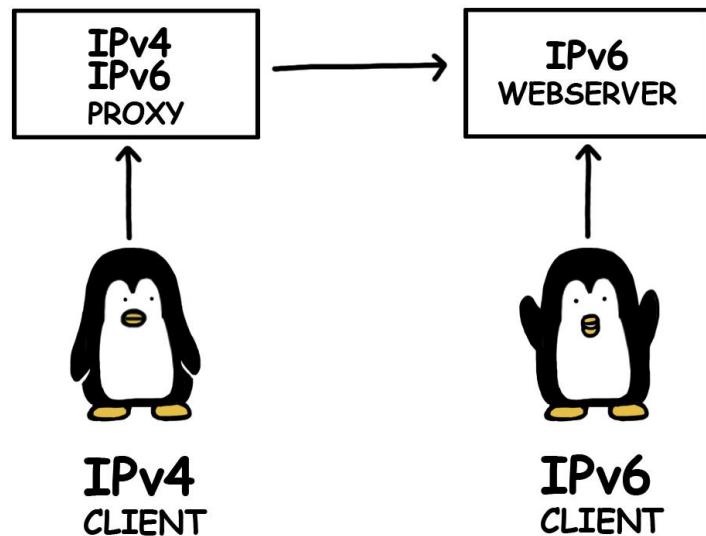
- Changing to PXE/Netboot
 - Some firmware does not support DHCPv6
 - Introduce separate boot network
 - After booting up, the operating system only acquires IPv6
- Dualstack VMs: IPv4 scarcity bites us
 - Strong tension between sales & infrastructure operators
- How to continue?

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



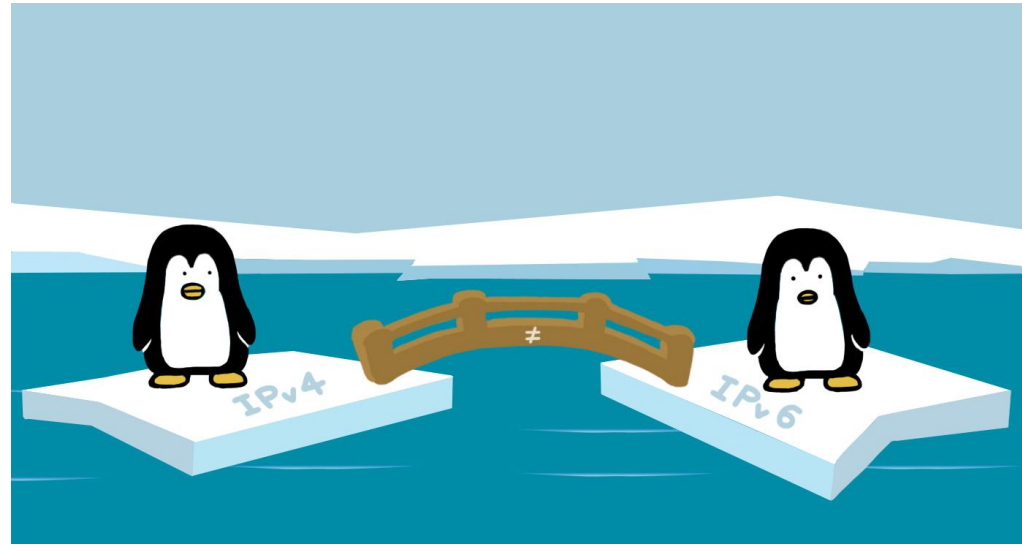
Stage 3: IPv6 on steroids

- Launched <https://ipv6onlyhosting.com>
 - No incoming NAT64
 - Only reachable by IPv6
- How can this be useful?
 - Development: yes
 - Testing/experiments: yes
 - Production: yes
 - Many websites
 - Many web applications
 - Chat systems

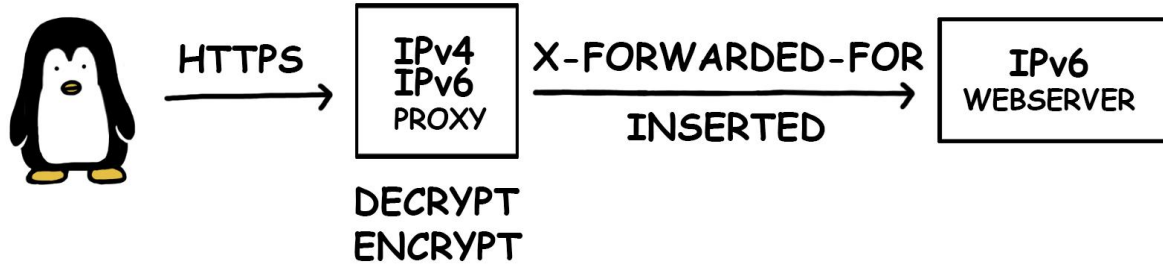


Stage 3: Smart NAT64

- Static 1:1 mappings are not helpful
- Need to have 1:n mappings
- Introducing: proxy based IPv4
 - http proxy: ok
 - https proxy: ok
 - smtp forwarding: ok
 - dns “proxy”: in progress

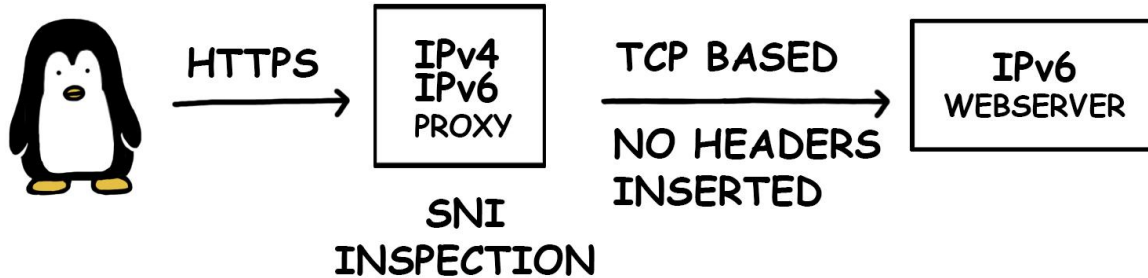


HTTPS (V1:OPENNING UP)



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HTTPS (V2:TCP)

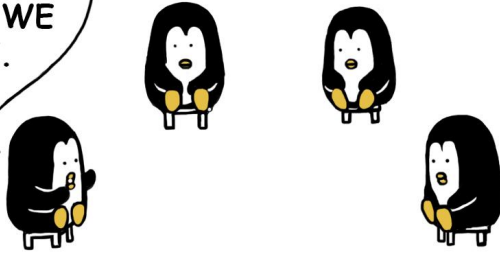


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1

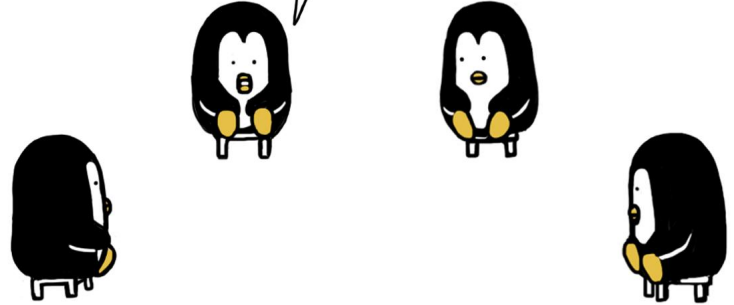
IPv4 ANONYMOUS

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.



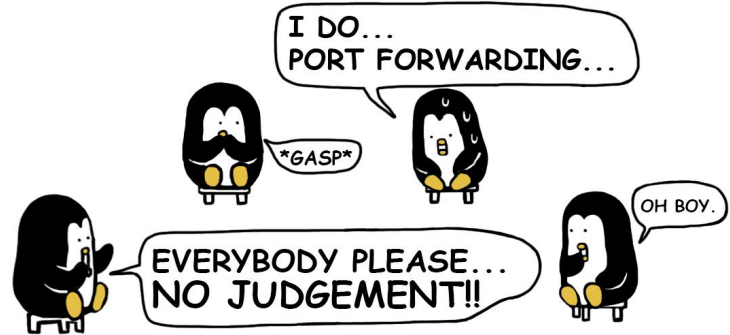
4

I DO... PORT FORWARDING...

GASP

EVERYBODY PLEASE... NO JUDGEMENT!!

OH BOY.



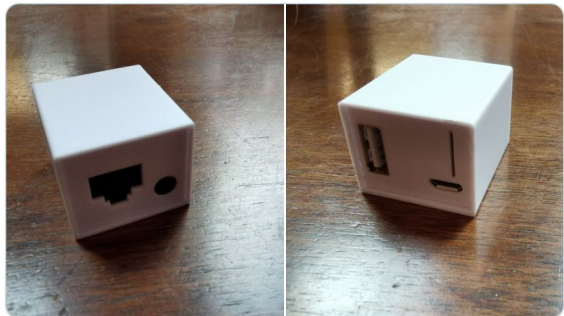
THESE PENGUINS NEED IPv6.

ipV6onlyhosting.com



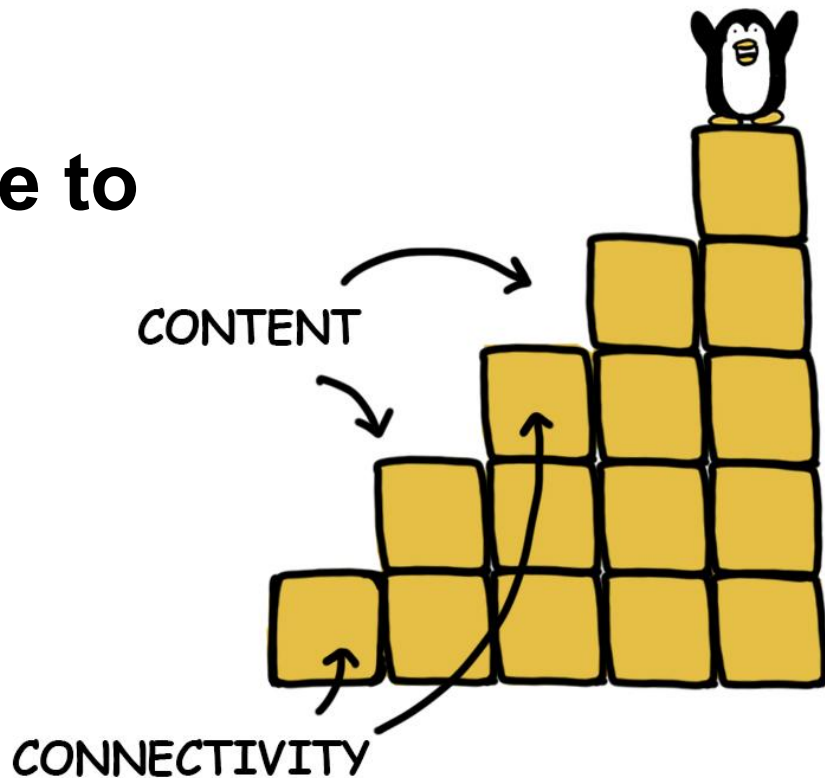
Stage 4: Focus on IPv6

- Servers boot in IPv6 only networks
 - Using iPXE on a USB stick when vendor firmware does not work
- Phasing static NAT64 mapping back in
 - Product: IPv4 address (as-a-mapping)
- Using the VIIRB to enable customer networks
 - For accessing IPv6 only resources
 - To allow them to connect to the office
 - To allow firewall rules matching their office



How to convince people to use IPv6?

Everyone can contribute to
IPv6 growth today.



More of this?

- Get in touch ...
 - via email: ipv6@ungleich.ch
 - via chat: <https://IPv6.chat>
 - via matrix: [#ipv6:ungleich.ch](https://matrix.org/#/ipv6:ungleich.ch)
- Share your IPv6 experiences on <https://IPv6.blog>
- Run your own IPv6 only service

THIS PENGUIN NEEDS IPV6.

