Marcin Włodarczak

co nieco o ipv6

IPv4 = 2^32

132.122.11.43

```
4,290,000,000
 |   |    |   Hundreds
 |   |  Thousands
 |  Millions
Billions
```
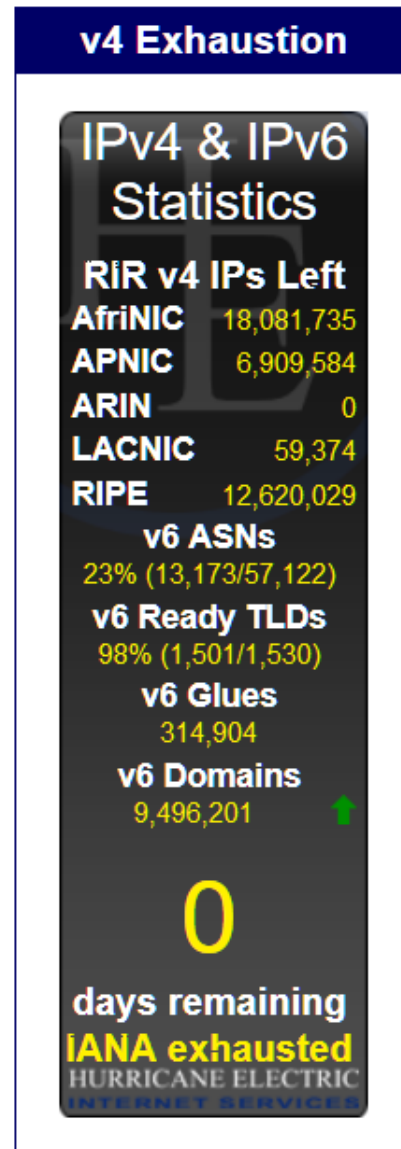
MAC address = 2^48

00:0a:ca:ff:ee:e0

~= 281,000,000,000,000

(to się przyda później)

O dwóch stosach i "przyszłości internetu"

v4 Exhaustion

IPv4 & IPv6
Statistics

RiR v4 IPs Left
AfriNIC   18,081,735
APNIC   6,909,584
ARIN   0
LACNIC   59,374
RIPE   12,620,029
v6 ASNs
23% (13,173/57,122)
v6 Ready TLDs
98% (1,501/1,530)
v6 Glues
314,904
v6 Domains
9,496,201

0

days remaining
IANA exhausted
HURRICANE ELECTRIC
INTERNET SERVICES

O dwóch stosach i "przyszłości internetu"

IPv6 = 2^128

340,000,000,000,000,000,000,000,000,000,000,000,000
  | | | | | | | | | | | Hundreds
  | | | | | | | | | | | Thousands
  | | | | | | | | | | Millions
  | | | | | | | | | Billions
  | | | | | | | | Trillions
  | | | | | | | Quadrillions
  | | | | | | Quintillions
  | | | | | Sextillion
  | | | | Septillions
  | | | Octillion
  | | Nonillion
  | Decillion
Undecillion

Total IPV4 Addresses: 4294967296

IPv6 Addresses **per** person:

51557934381960373252026455671

O dwóch stosach i "przyszłości internetu"
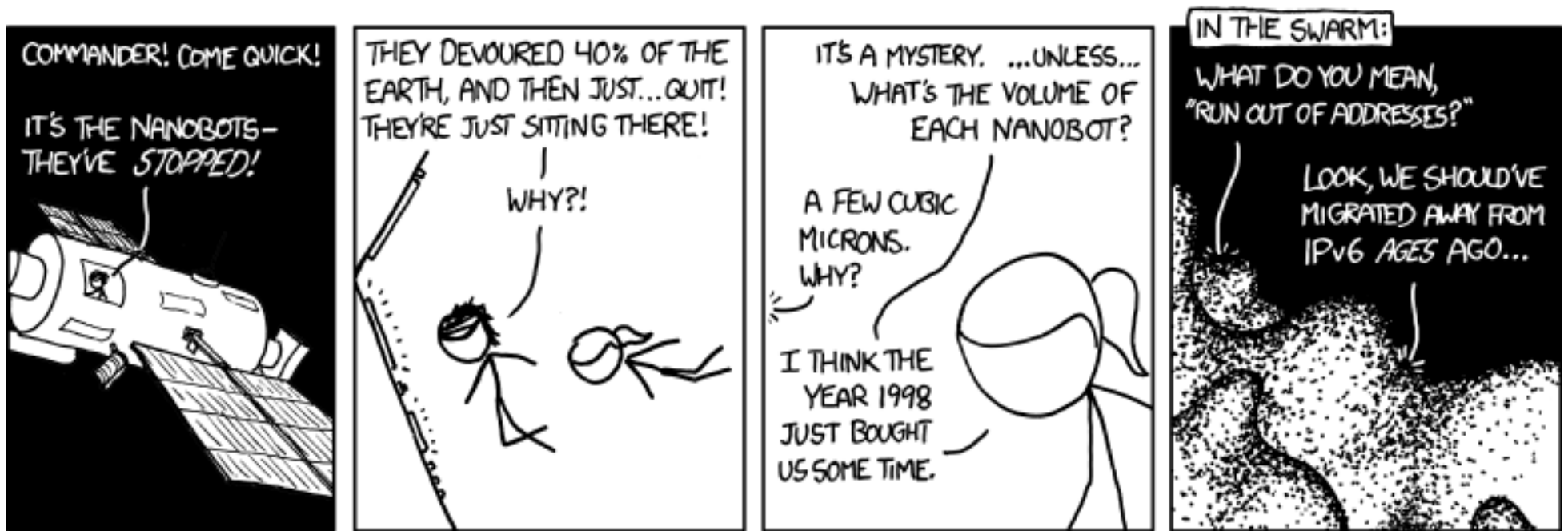
„I think the IETF hit the right balance with the 128 bits thing. We can fit MAC addresses in a /64 subnet, and the nanobots will only be able to devour half the planet."

O dwóch stosach i "przyszłości internetu"

Adres IPv6:

2001:1a68:19:8013::2

2001:1A68:0019:8013:0:0:0:2

2001:1A68:0019:8013:0000:0000:0000:0002

Jak to wygląda w praktyce?

Jak to wygląda w praktyce?

- Normalnie :)

Jak to wygląda w praktyce?

- Normalnie :)

=> konfiguracja „po staremu"
(oczywiście z nowym adresem)

Jak to wygląda w praktyce, praktyce?

- Nienormalnie. :/

=> dual-stack

Dual-stack = schizofrenia?

- DNS? (AAAA!)
- DHCP (SLAAC, DHCP6, RA, RS, ...)
- Routing (BGP6, OSPF6, ...)
- Usługi

- Aplikacje

- Sprzęt (!)

- Tak czy siak, musimy jakoś skomunikować te dwa światy.

Jak?

Stateless IP/ICMP Translation | Tunnel broker | 6rd | Transport Relay Translation
NAT64 | DNS64 | ISATAP | 464XLAT | Dual-Stack Lite (DS-Lite)

Draft proposals: 4rd | MAP

Deprecated methods 11.1 NAT-PT | 11.2 NAPT-PT

6bone, itp. itd.

 - AAAA przez IPv4?

 - In the IPv6 world, each physical network interface has what is called a link-local address (prefix fe80::/64) that remains no matter what the global ("public") IPv6 address is.

„In the field of IPv6 deployment, **IPv6 brokenness** was bad behavior seen in early tunneled or dual stack IPv6 deployments where unreliable or bogus IPv6 connectivity is chosen in preference to working IPv4 connectivity. This often resulted in long delays in web page loading, where the user had to wait for each attempted IPv6 connection to time out before the IPv4 connection was tried. These timeouts ranged from being near-instantaneous in the best cases, to taking anywhere between four seconds to three minutes."

„As of 2017, IPv6 brokenness is now generally regarded as a non-problem. This is due to two factors: firstly, **IPv6 transport is much improved**, so that the underlying error rate is much reduced, and secondly, that common applications such as web browsers now use **fast fallback methods** such as the "Happy Eyeballs" algorithm to select whichever protocol works best. Some operating system vendors have rolled fast fallback algorithms into their higher-level network stack APIs, […]"

„**Happy Eyeballs** (also called **Fast Fallback**) is an algorithm published by the [IETF](#) which can make [dual-stack](#) applications (those that understand both [IPv4](#) and [IPv6](#)) more responsive to users by attempting to connect using both IPv4 and IPv6 at the same time (preferring IPv6), thus avoiding the usual problems faced by users with imperfect IPv6 connections or setups."

https://en.wikipedia.org/wiki/IPv6_brokenness_and_DNS_whitelisting

„We've just released a whitepaper discussing the behavior of different operating systems once they receive IPv6 configuration parameters from different sources. For that purpose a number of lab tests were conducted.

In short, it's a mess. Again, [RFC ambiguity](#) and/or (perceived) vendor implementation freedom suck big time. For us practitioners out (t)here this means (once more) we need extensive test labs and good troubleshooting guides for large scale IPv6 deployments."

https://insinuator.net/2015/03/ipv6-router-advertisement-flags-rdnss-and-dhcpv6-conflicting-configurations/

Wsparcie w systemach:

https://www.theregister.co.uk/2017/01/19/windows_10_bug_undercuts_ipv6_rollout/

inne faile?

World IPv6 Day was a technical testing and publicity event in 2011 sponsored and organized by the <u>Internet Society</u> and several large Internet content services to test and promote public <u>IPv6 deployment</u>

[...]

World IPv6 Launch day on June 6, 2012 which, instead of just a test day, was planned to permanently enable IPv6 for the products and services of the participants.

World IPv6 Day was a technical testing and publicity event in 2011 sponsored and organized by the Internet Society and several large Internet content services to test and promote public IPv6 deployment

[...]

World IPv6 Launch day on June 6, 2012 which, instead of just a test day, was planned to permanently enable IPv6 for the products and services of the participants.

Results
Major carriers measured the percentage of IPv6 traffic of all Internet traffic as increasing from 0.024% to 0.041%.

O dwóch stosach i "przyszłości internetu"

Google   IPv6

Ready for the future of the Internet?

✔   No problems detected.
      You don't have IPv6, but you shouldn't have problems on websites that add IPv6 support.

Learn more about IPv6, or read about World IPv6 Launch.

Google

O dwóch stosach i "przyszłości internetu"

Ready for the future of the Internet?

✔ Yes, looks like you're using IPv6 already.
Welcome to the future of the Internet!

Learn more about IPv6, or read about World IPv6 Launch.

Google

O dwóch stosach i "przyszłości internetu"

✓ **IPv6 addresses for nameservers** ❓
2 out of 5 nameservers have IPv6 addresses [details]

✓ **Nameserver IPv6 connectivity** ❓
All IPv6 nameservers responded [details]

✓ **IPv6 address(es) for web server(s)** ❓
Got IPv6 record(s) for webserver from IPv6 nameservers [details]

✓ **IPv6 address(es) for bare domain name** ❓
1 AAAA record found for bare domain [details]

✓ **Web server IPv6 connectivity** ❓
1 webserver responded OK [details]

✓ **Secure web server IPv6 connectivity** ❓
1 webserver responded OK [details]

✓ **IPv6 addresses for incoming mail servers** ❓
1 of 1 MX servers have IPv6 addresses [details]

✓ **Mail server IPv6 connectivity** ❓
All IPv6 mail servers responded [details]

✓ **Reverse DNS for mail server IPv6 addresses** ❓
All MXs have reverse DNS for IPv6 addresses [details]

✓ **SPF records refer to hosts with IPv6 addresses** ❓
SPF record OK [details]

✓ **IPv6 nameserver delegation and glue trace (experimental)** ❓

some more details on what exactly the tests are looking for.

To by było na tyle…
Dziękuję za uwagę.

No, chyba że jakieś pytania.