

IPv6

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IP overview

- ▶ **IP** (Internet Protocol) – an L3 protocol in the ISO/OSI model
- ▶ An intermediate protocol, however very important
- ▶ Relays data across network boundaries
- ▶ Negotiates different physical layer technologies
- ▶ Establishes the Internet

IP address

- ▶ Each host (a network participant, except L2/L1 devices) has an unique IP address
- ▶ Usually you don't use it directly (*and there's a reason for that!*)
- ▶ Nonetheless it's a necessary part of a communication process
- ▶ For example, you can't call the phone if you don't know it's number

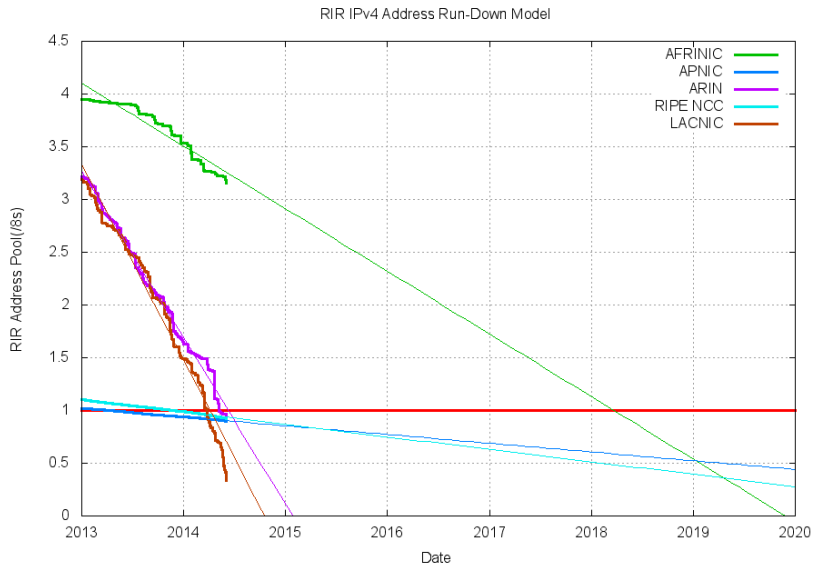
IP address

- ▶ IPv4 – still 96% of the traffic
- ▶ Addresses are 32 bit sized
- ▶ $2^{32} \approx 4$ billion addresses
- ▶ It's a lot?

- ▶ Feature phones
- ▶ POS terminals
- ▶ Sensors
- ▶ It's a lot? **Nope.**

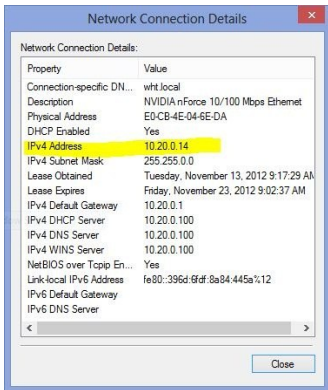


IPv4 address exhaustion



Popular solutions

- ▶ Two popular solutions: Proxy and NAT
- ▶ Like a call center: one number, many phones.



Class	Private Address Range
A	10.0.0.0 to 10.255.255.255
B	172.16.0.0 to 172.31.255.255
C	192.168.0.0 to 192.168.255

What's the problem?

- ▶ Relies on higher-level protocols
- ▶ Slower than a simple routing
- ▶ The main drawback: an address is not unique anymore.
- ▶ Cannot accept incoming connections
- ▶ Often called a “grey” IP address
- ▶ Conclusion: an IPv4 address is just a bunch of numbers nowadays, that's the reason why you don't use it directly.

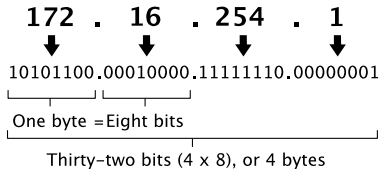
DON'T SLEEP!



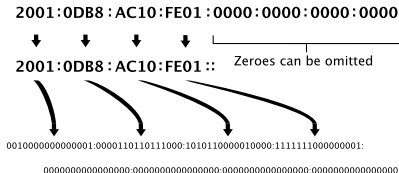
IPv6

- ▶ Since 1996
- ▶ 2^{128} addresses, or approx. $3.4 \cdot 10^{38}$

An IPv4 address (dotted-decimal notation)



An IPv6 address (in hexadecimal)



Minor changes

- ▶ ARP \Rightarrow NDP
- ▶ Broadcast via multicast
- ▶ DHCP \Rightarrow SLAAC
- ▶ IPv6 routers do not perform fragmentation
- ▶ TTL \Rightarrow Hop limit

IPv6 adoption rate

