Linked in
TM

IPv6@LinkedIn

Zaid Ali Kahn

Senior Director, Infrastructure Engineering
LinkedIn

Why does IPv6 matter @LinkedIn?

IPv4 is running out

- IANA exhausted free /8 pool Feb 2011
- APNIC final /8
- ARIN free pool depleted

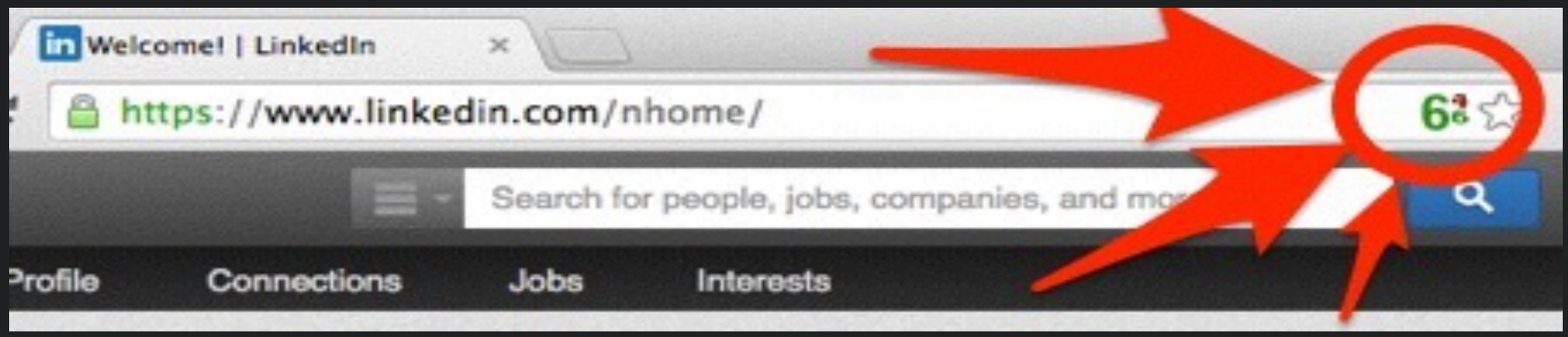
IPv6 performs better

- Strong data for mobile users
- Continued high growth with mobile carriers

Larger datacenters

- RFC1918 exhaustion

LinkedIn IPv6 launch



Edge services Launched September 8th 2014

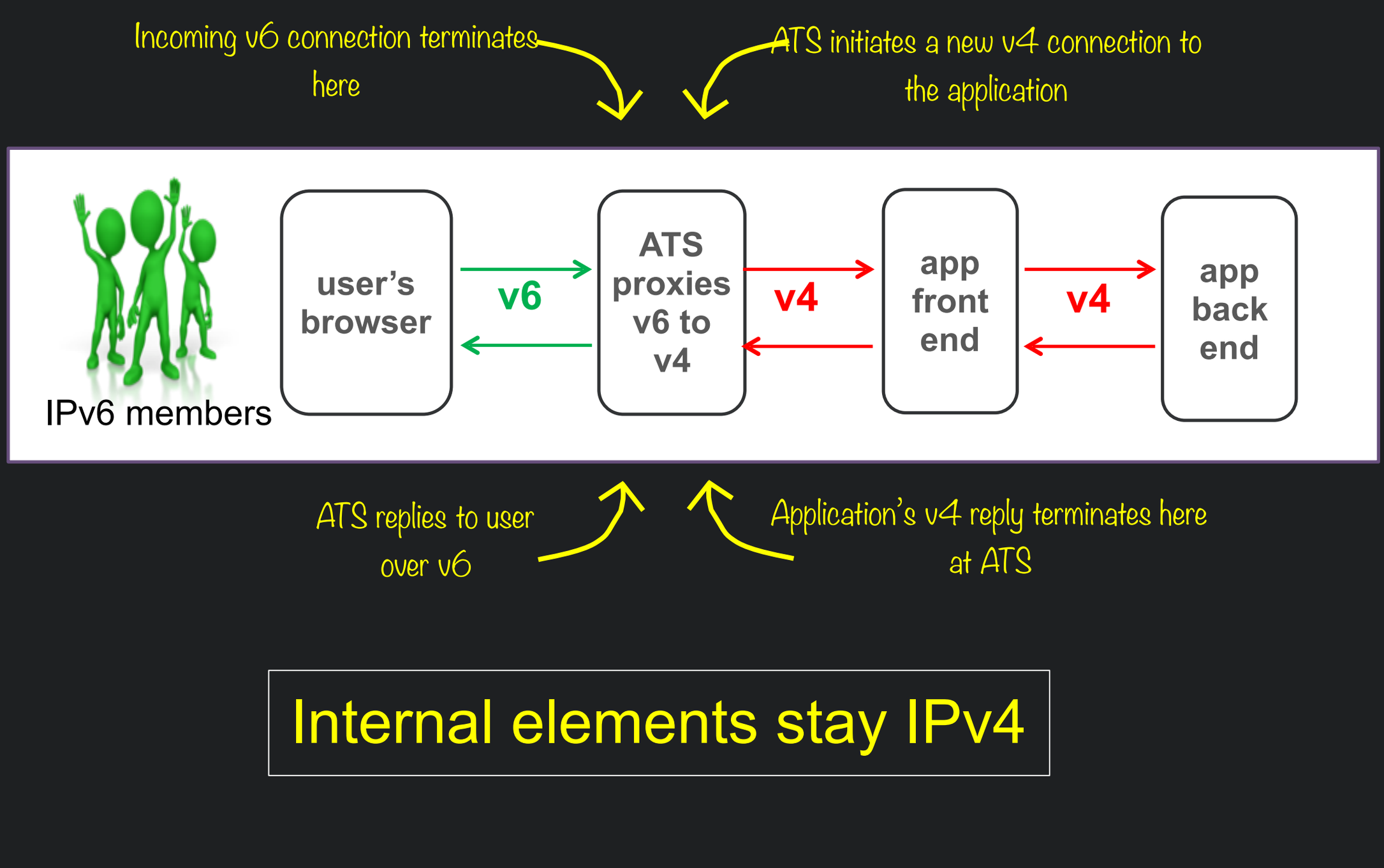
One year of work to transition

Multiple testing of site with real user traffic

Zero site outage

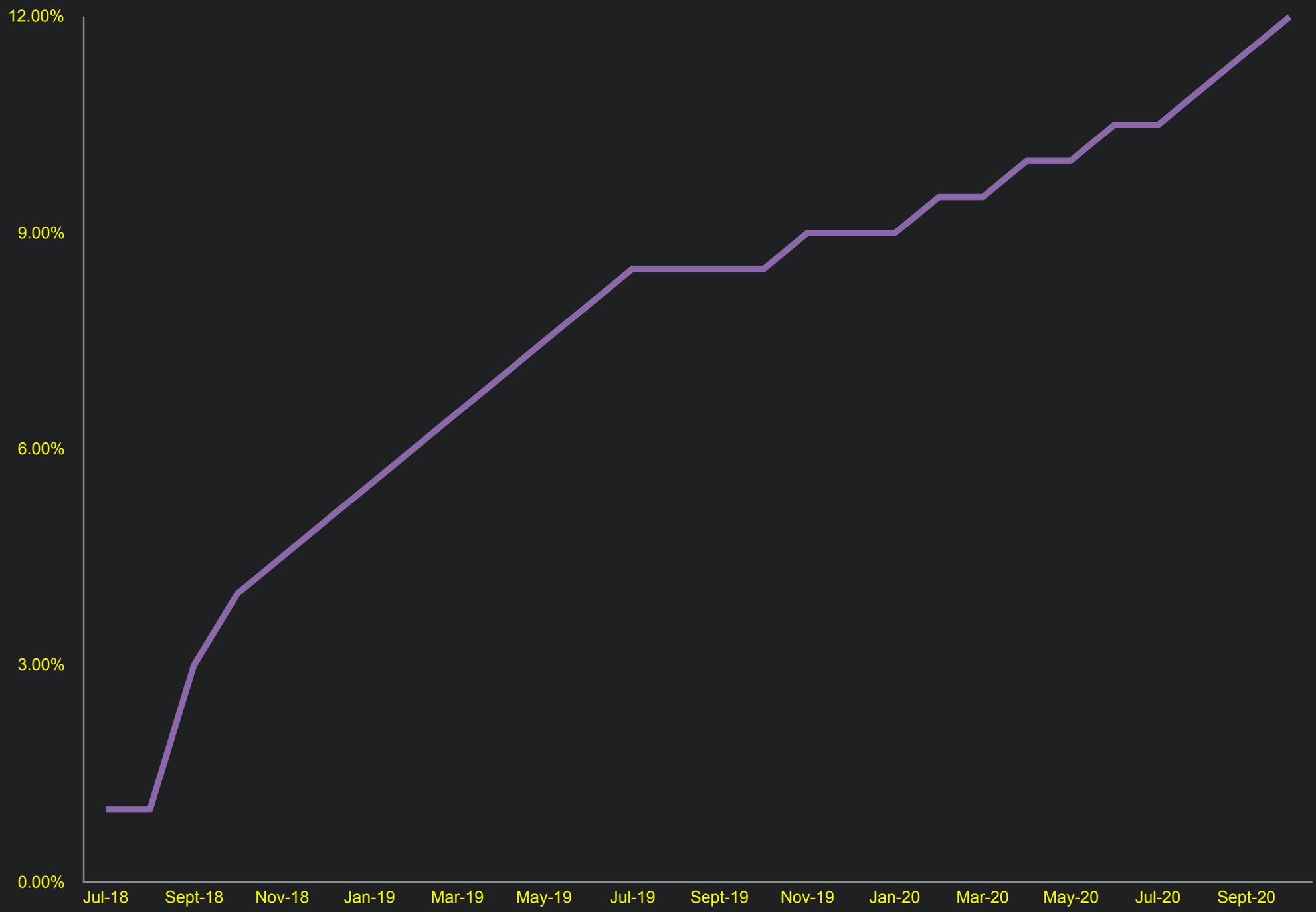
IPv6-enable the edge

members can communicate over IPv6

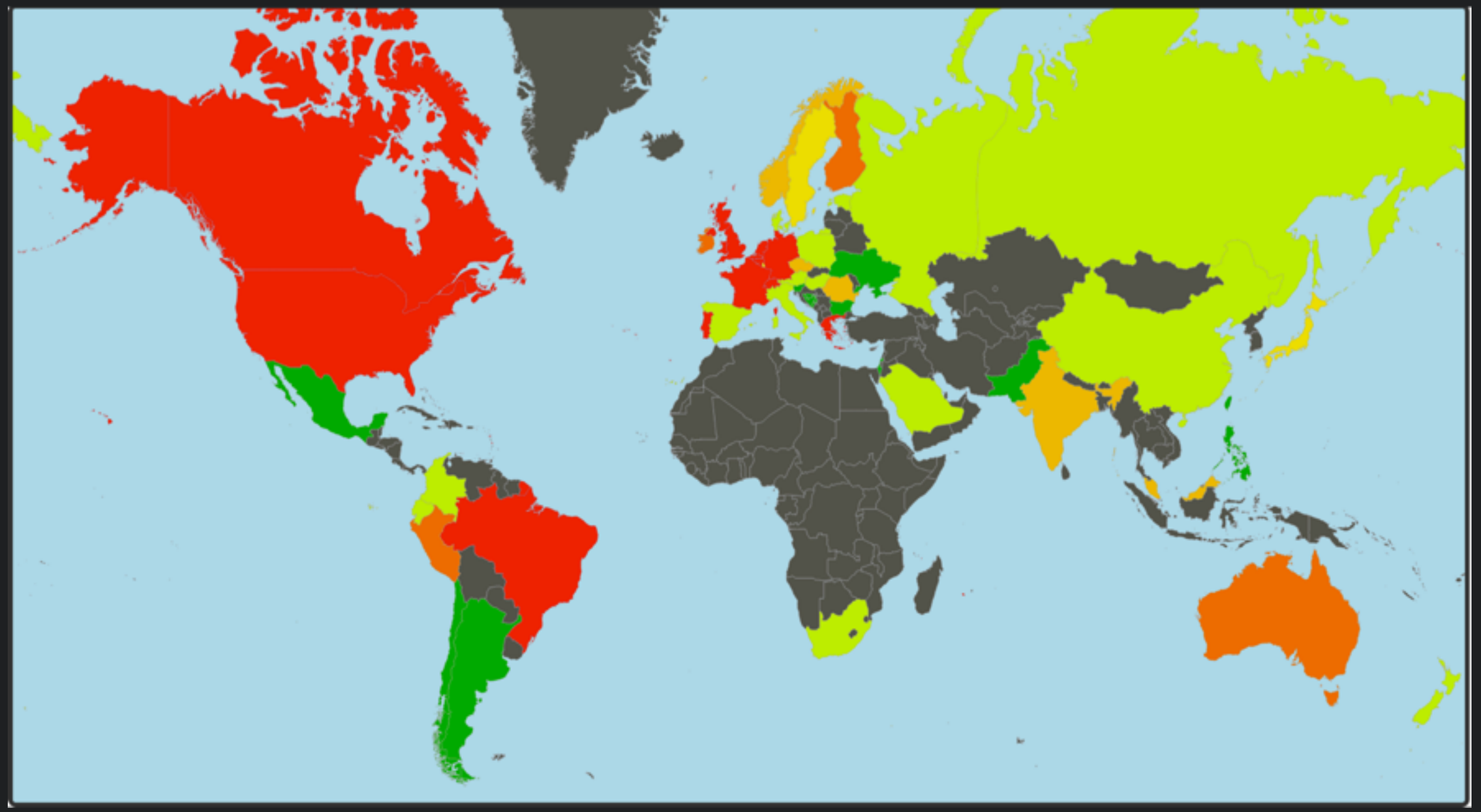


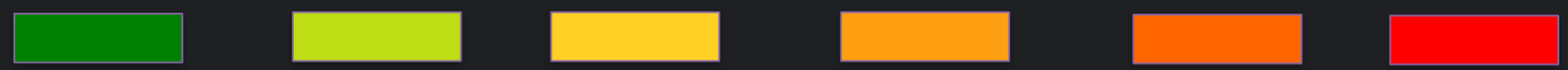
Internal elements stay IPv4

IPv6 growth at LinkedIn

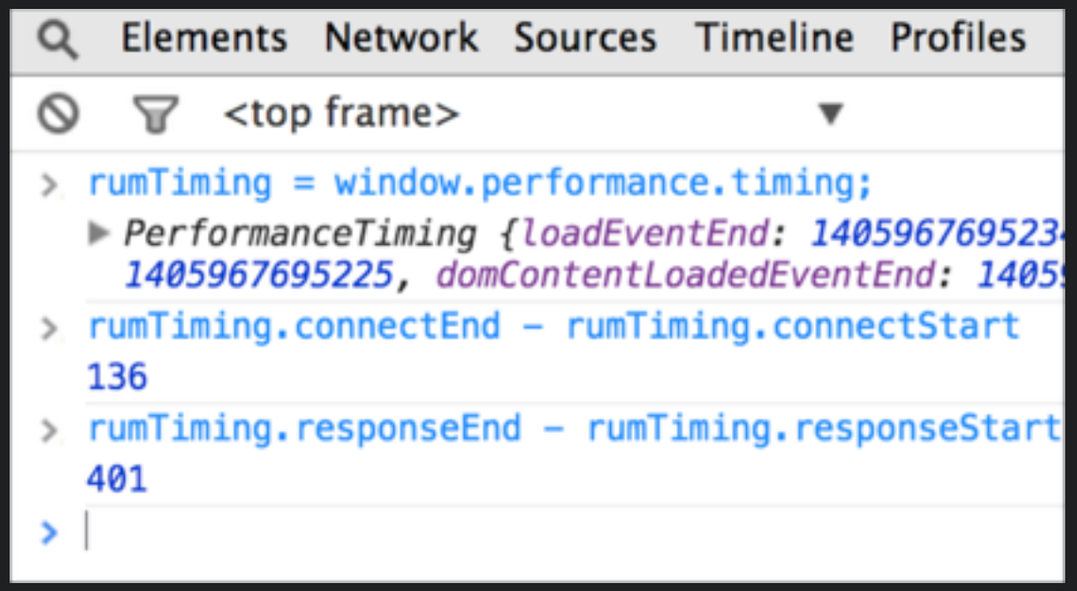


IPv6 global heatmap





RUM – Real User Monitoring



Most browsers support RUM

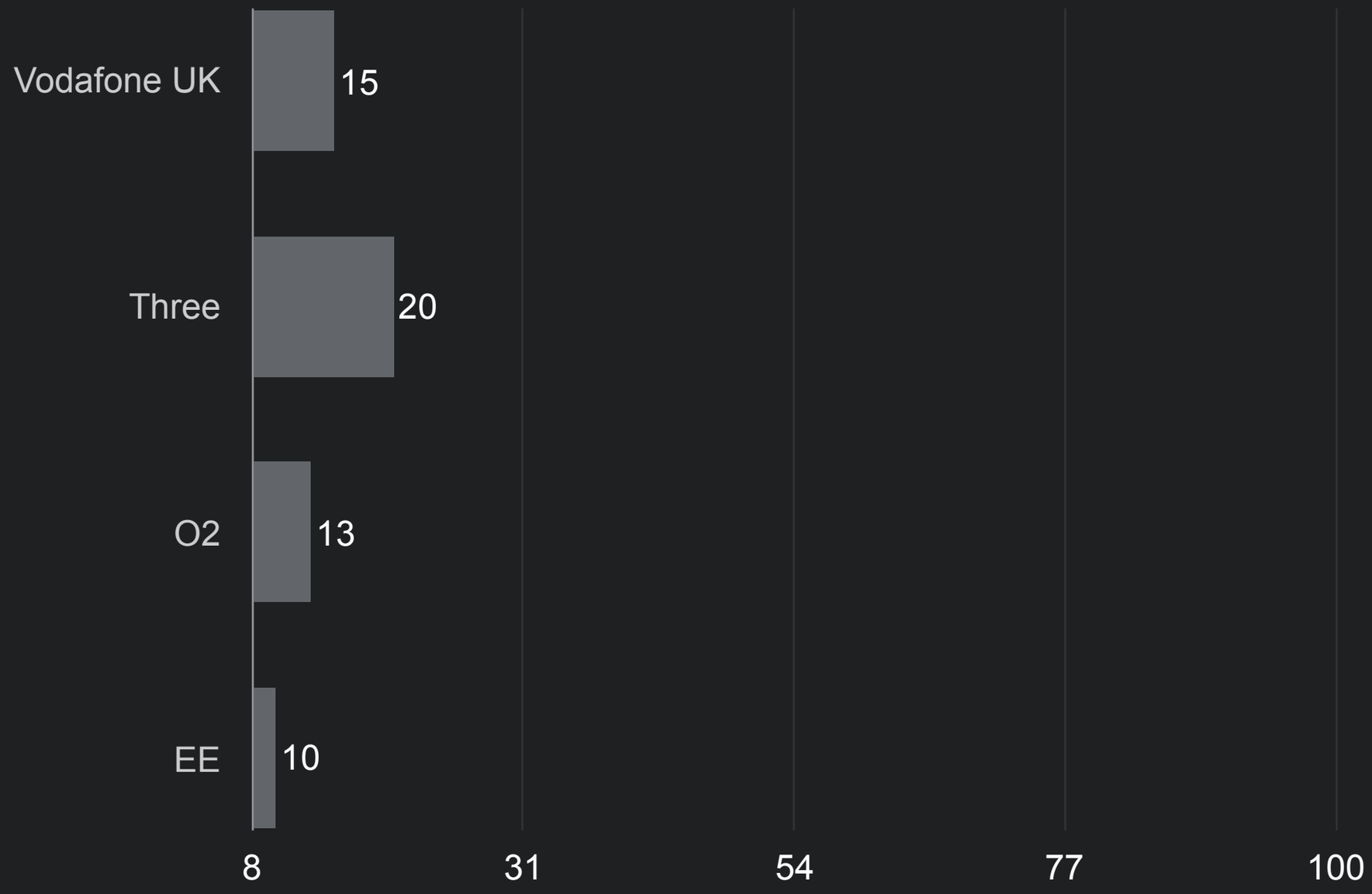
Navigation timing API

- Browsers record performance timers for each payload.

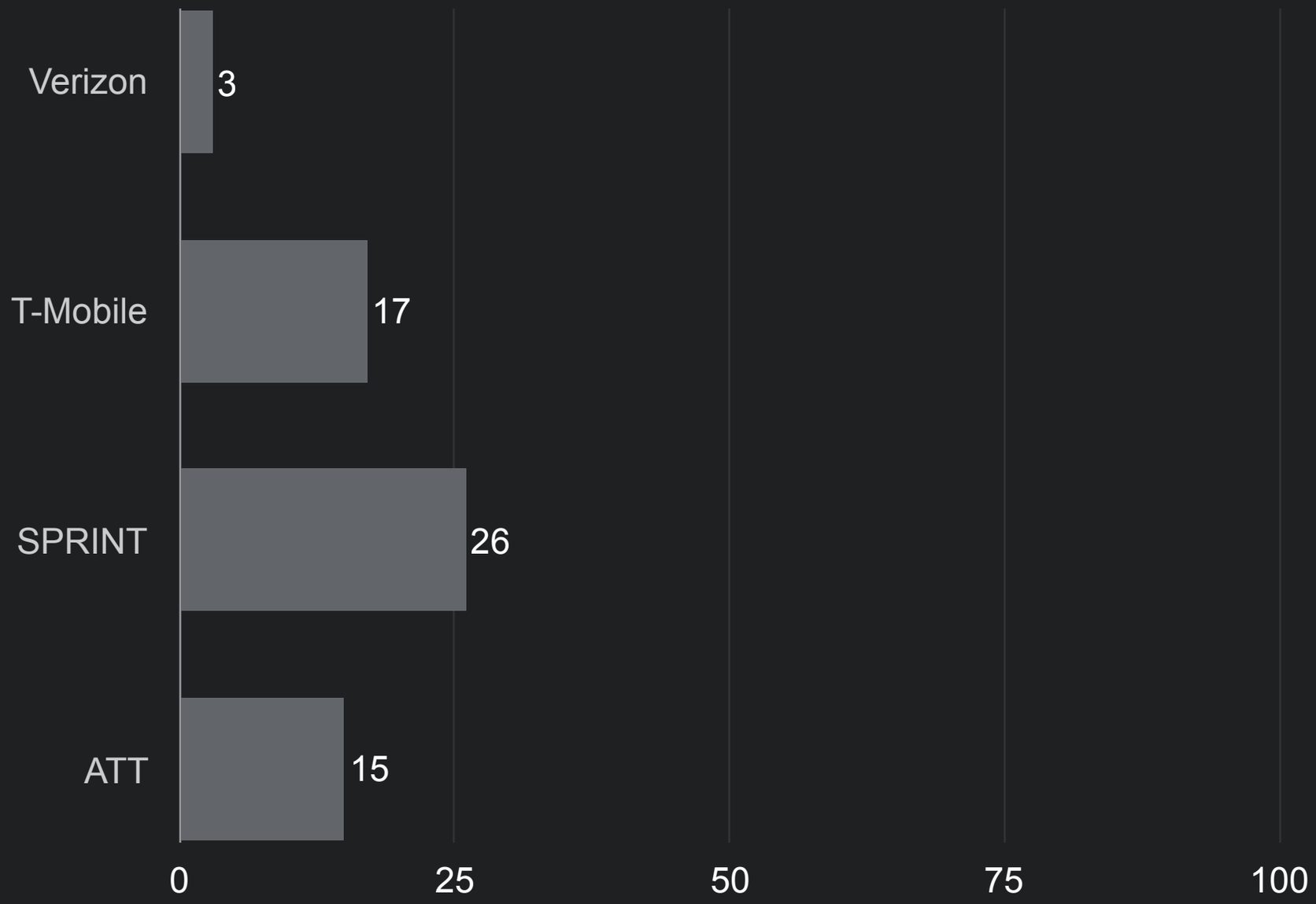
Mobile end-end control

- Client/Server control gives full visibility
- Light weight beacon

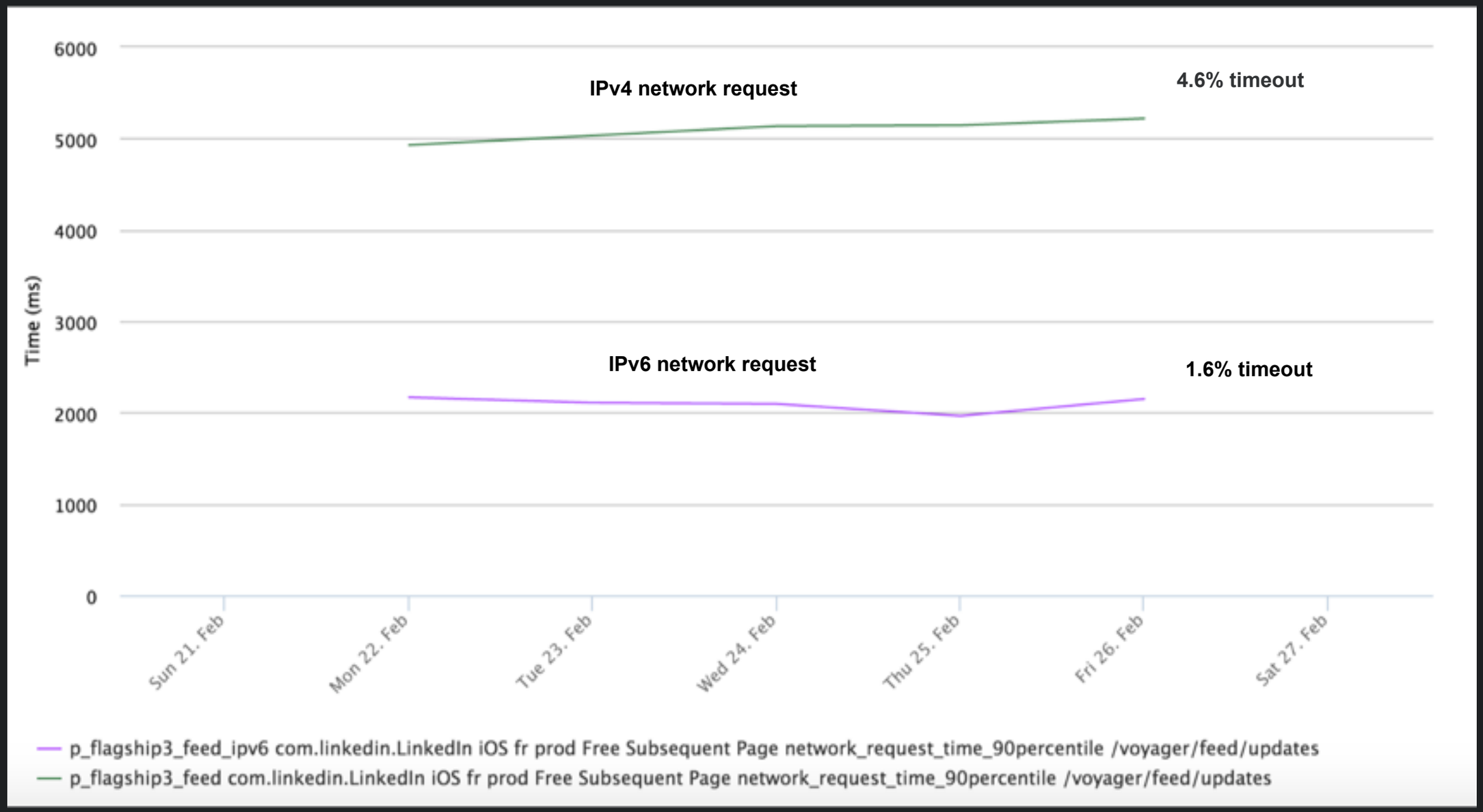
Mobile Performance (UK)



Mobile Performance (USA)



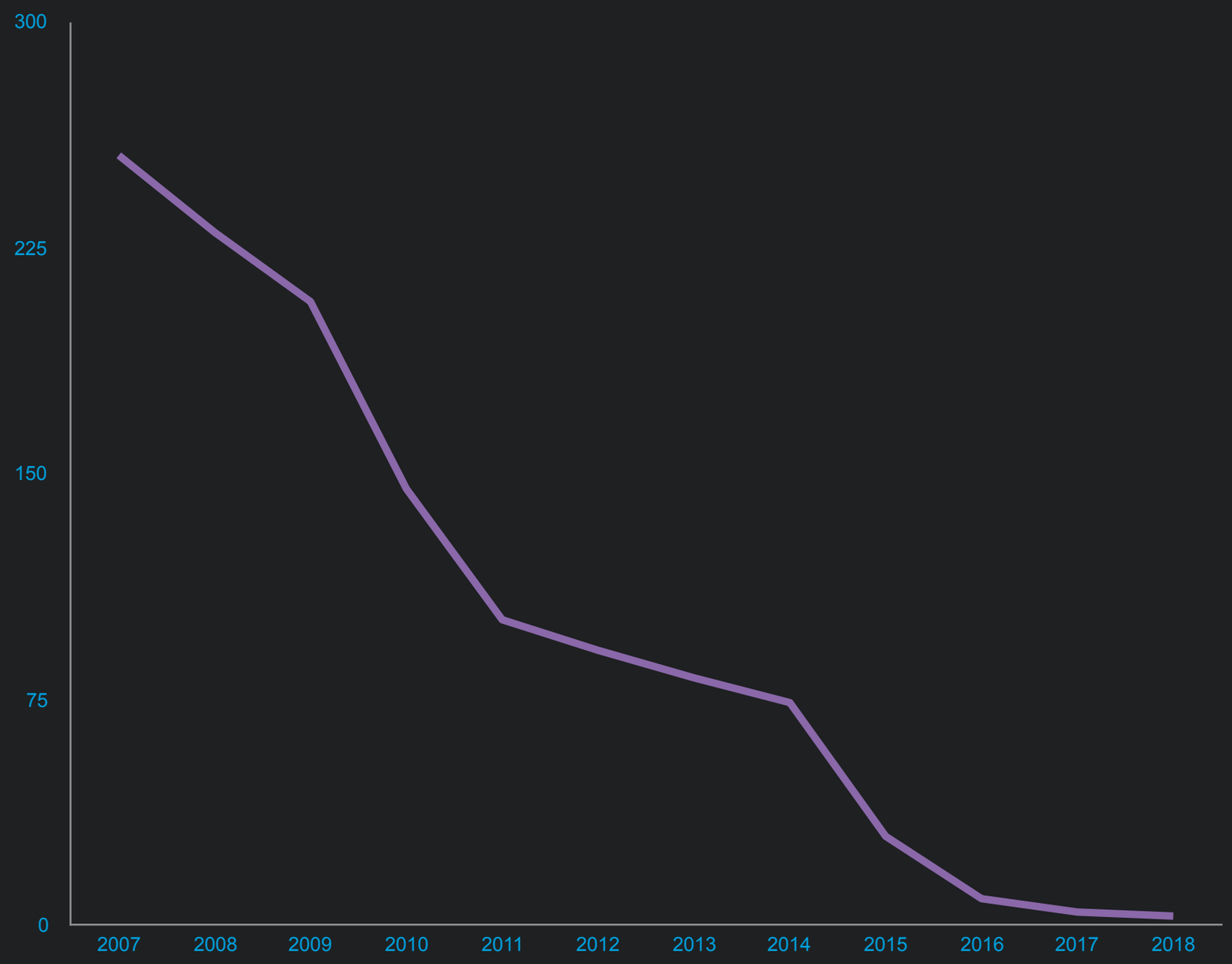
IPv6/IPv4 timeout



Higher network request time means higher TCP timeouts yielding in higher page download load times.

IPv6 inside the datacenter

Datacenters RFC1918 /8 exhaustion



Plan/Key Steps

- Dual stack latest datacenter in Oregon (2016)
- Dual stack remaining datacenters (2016-2017)
- Application stack migrates to support IPv6
- New datacenters in 2017 IPv6 only
- Turn off IPv4 by 2018

What you have to think about

- Verifying all existing devices and futures devices fully support IPv6 and able to scale
- Having conversations with application developers and SRE teams.
- Making a case with data.
- Subnetting and numbering policies
- DHCPv6/SLAAC
- Infrastructure automation tools
- DC RDU, Power management
- DNS, Syslog, Auth, NTP
- Packet too big (PTB) – ensure messages are generated.

Things you should not do

- Any kind of NAT. Live in the future!
- When designing address pools don’t map to IPv4. Think IPv6!
- Don’t do this:

2620:abcd:efef::192.168.1.1

Instead

find AAAA
if not found {
get A
find IPv6 paired_subnet_id of A
Take last 2 bytes of A, convert to hex, pseudo AAAA is IPv6 paired_subnet_id with last 2 bytes of A
}

$ host dc1-gggg.env1.linkedin.com
dc1-gggg.env1.linkedin.com has address 10.136.150.167
host dc1-gggg.env1.linkedin.com has IPv6 address 2620:f549:14:4124::96a7

Future work

- IETF draft: draft-ali-ipv6rtr-reqs-00
- “Requirements for IPv6 Routers”
  - YANG [RFC7223] [RFC7224] [RFC7277] [RFC7317]
  - Netconf [RFC6241] / Restconf [I-D.ietf-netconf-restconf]
  - Zero Touch Provisioning [I-D.ietf-dhc-rfc3315bis]
  - SLAAC [RFC7217] [RFC7527]
  - Telemetry
  - Router handling of IPv6 addresses
  - MTU/Jumbo Frames
- Active discussions, please join and contribute!

Carrier
12:00 PM
KEEP
CALM
AND
Deploy IPv6
Faster

©2014 LinkedIn Corporation. All Rights Reserved.