BKNIX 2017 Bangkok
Cloudflare global and local peering

Martin J. Levy @ Cloudflare, Inc.

What are we going to talk about today?

- An introduction to Cloudflare's network
- Peering globally and locally
- Building local Thailand sites for the Cloudflare network
- The IPv6 switch at Cloudflare (because this is important)
- Summary

CLOUDFLARE

Cloudflare overview

- Founded in 2009; launched in 2010
- Used by more than six million Internet facing applications in 150+ countries
    - 15,000+ new customer sign-ups daily
- 4 minute sign-up process
    - $0 - $1.5 million annual subscription pricing
- Sit in front of 10% of all Internet requests
- 350%+ compounded annual revenue growth over last three years

CLOUDFLARE

- 418+ employees (speaking 41 languages)
    - *Offices in San Francisco, Champaign IL, Austin TX, Boston MA, Washington DC, London & Singapore*
- 115+ data centers dispersed across 57+ countries
- World Economic Forum Technology Pioneer
- Winner of *Wall Street Journal's* "Most Innovative Internet Company" two years running
- Self-learning network that becomes more performant, secure, and intelligent with every request

AS13335 / Cloudflare

- 6+ Million Internet properties
- 4.8 Million HTTP requests/sec
- 1.2 Million DNS queries/sec
- 115+ data centers (all v4/v6!)
- 1.4 Trillion page views per month

CLOUDFLARE

Enterprise solutions in every vertical

New customer additions in the past 6 months

APAC Customers (a sample)

Cloudlfare and peering (globally and local)

Cloudflare peers (globally and locally)

- Peering at nearly 160 Internet Exchanges
  - Europe, North America, South America, Asia, Africa, Australasia
- Two main catagories
  - Major locations where peering is a significant percentage of traffic
  - Minor locations where peering is adjunct to in-network partner pop
- Cloudflare is very pro-peering!

CLOUDFLARE

Bangkok Thailand

- Three dedicated locations within Bangkok

Jastel	AS45629
TOT	AS38040
AIS	AS45430

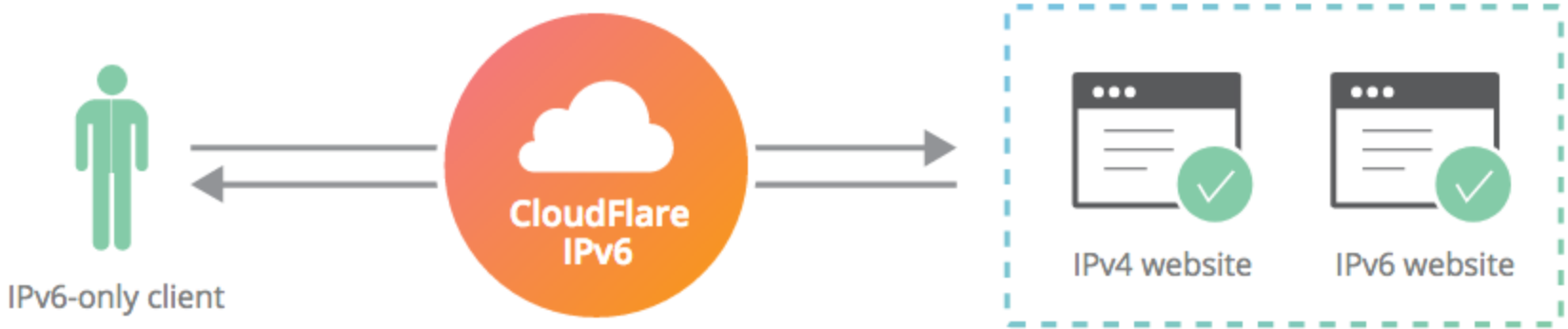
- Next up?

True	AS7470

CLOUDFLARE

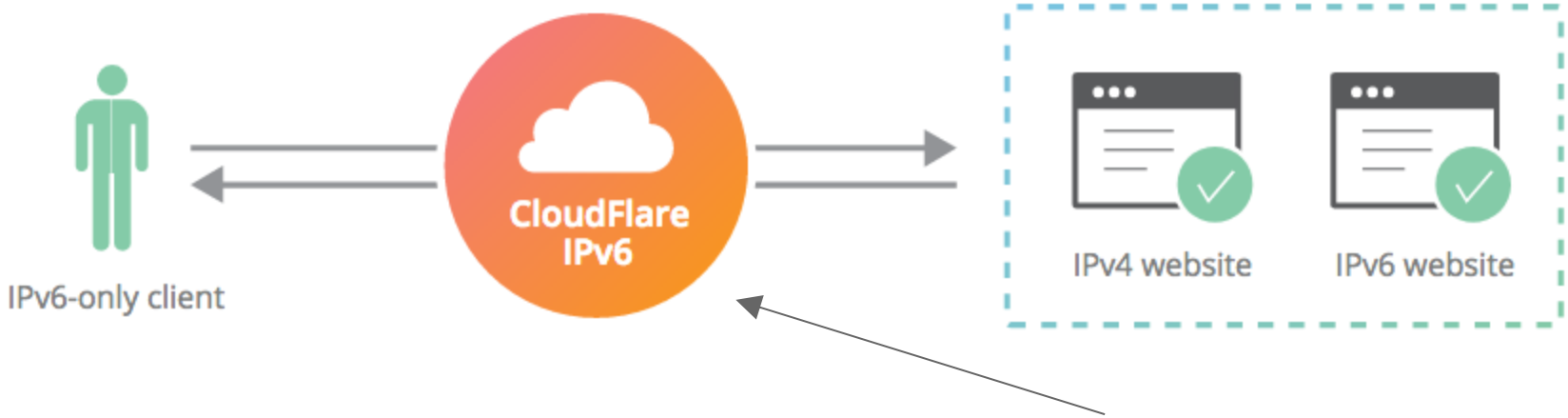
IPv6 @ Cloudflare

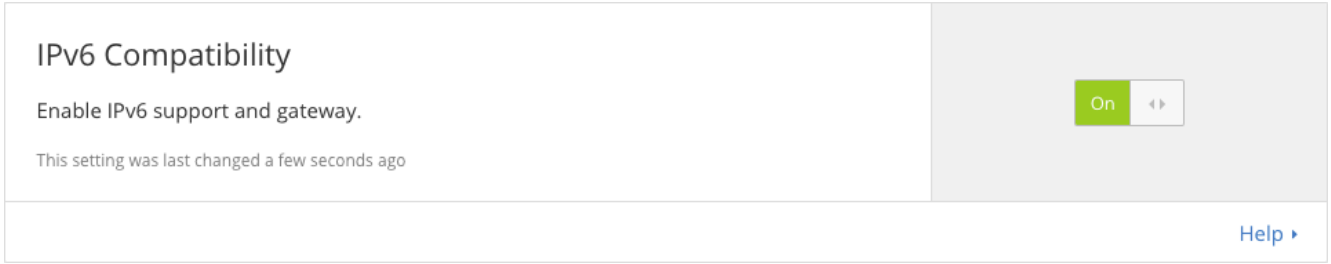
Cloudflare can be a “bridge” to IPv6



CLOUDFLARE

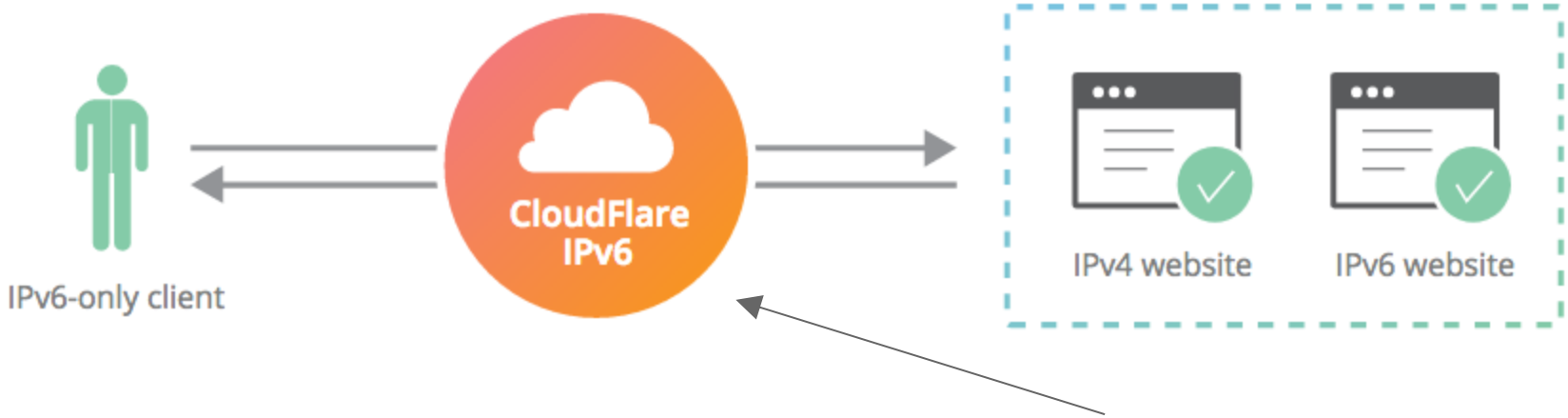
Cloudflare can be an IPv6 “bridge”

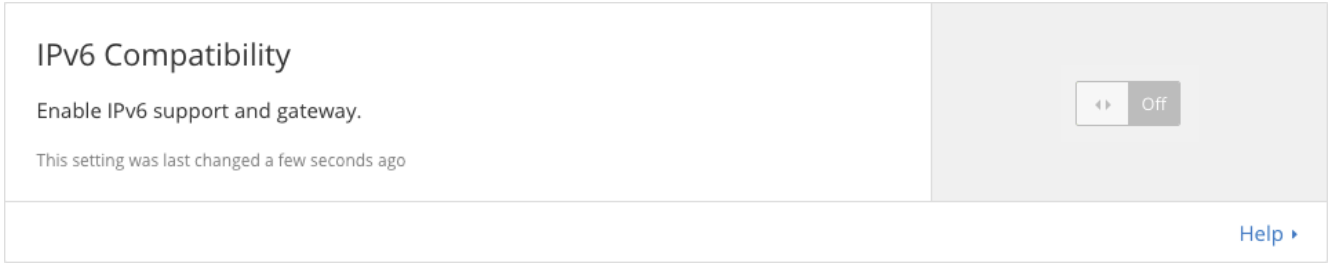




CLOUDFLARE

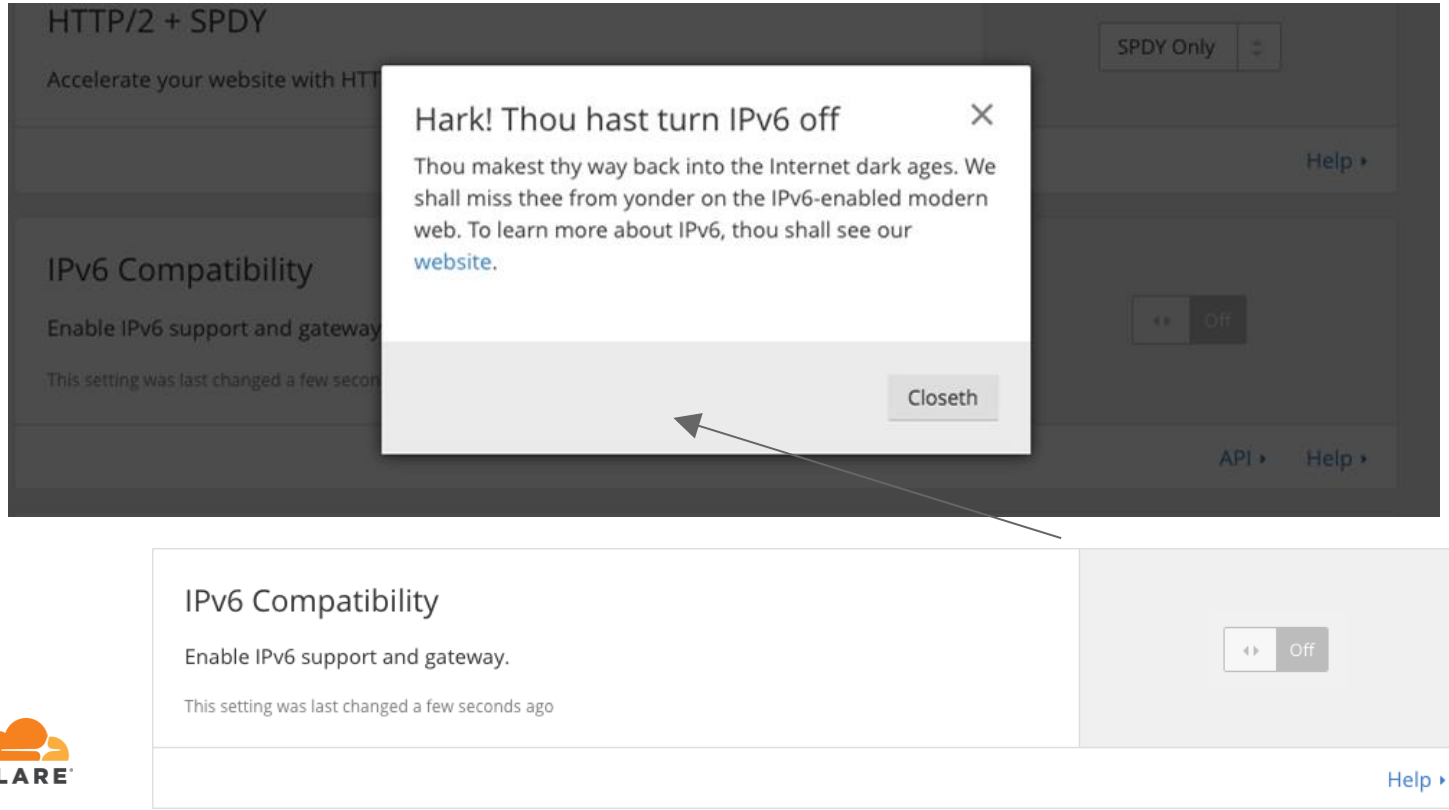
Cloudflare can be an IPv6 “bridge”





CLOUDFLARE

Cloudflare can be an IPv6 “bridge”

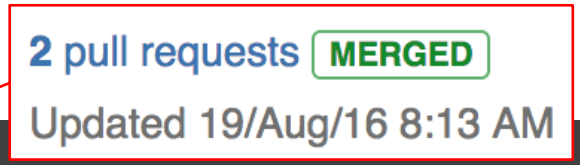


CLOUDFLARE

Flipping the switch!

Flipping the switch on every domain/zone

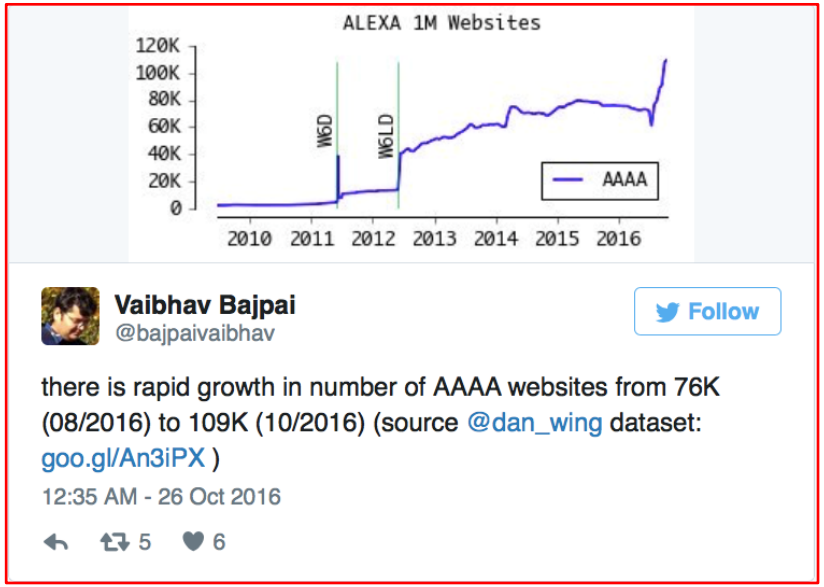
- Nearly five million zones on Cloudflare (at this point)
- If the user had never touched the IPv6 switch; then flip it on!
- Slow start; then running faster (around ~100,000 zones per day




```
for zone in all_zones:
    if zone.ipv6.value == False:
        if zone.ipv6.date == None:
            zone.ipv6.value = True
            zone.ipv6.date = Now()
    sleep()
```

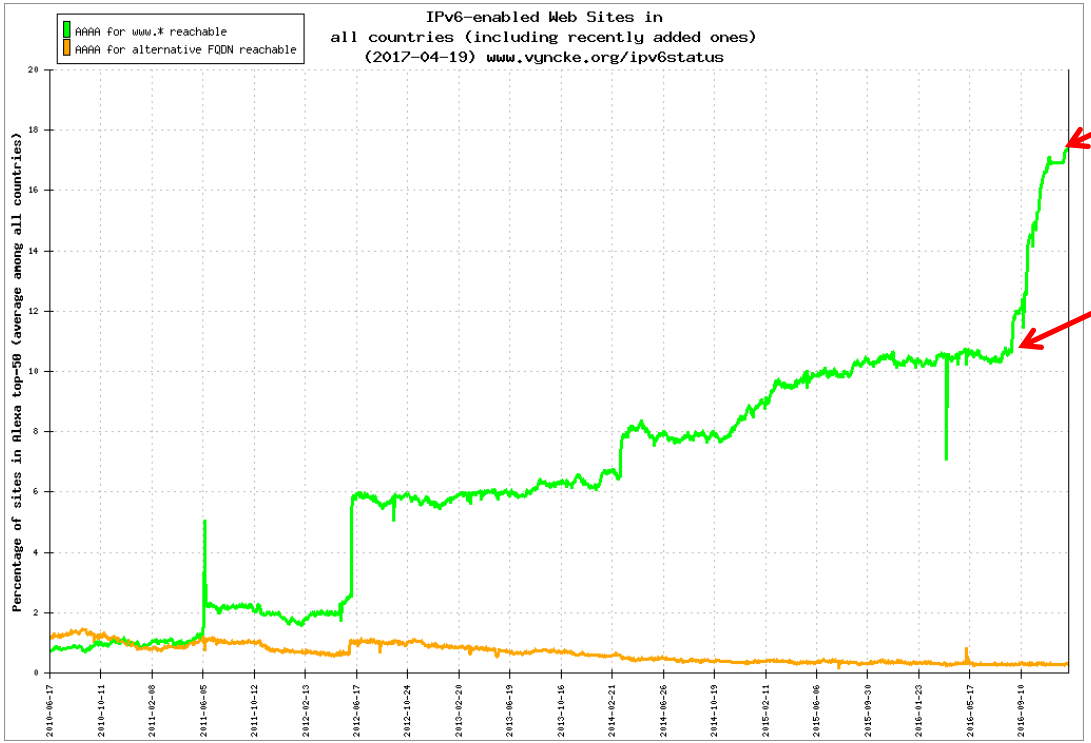
CLOUDFLARE

People (and you know who they are) noticed!



CLOUDFLARE

Eric Vyncke's graph is it's full glory!



Cloudflare hits 98.01%

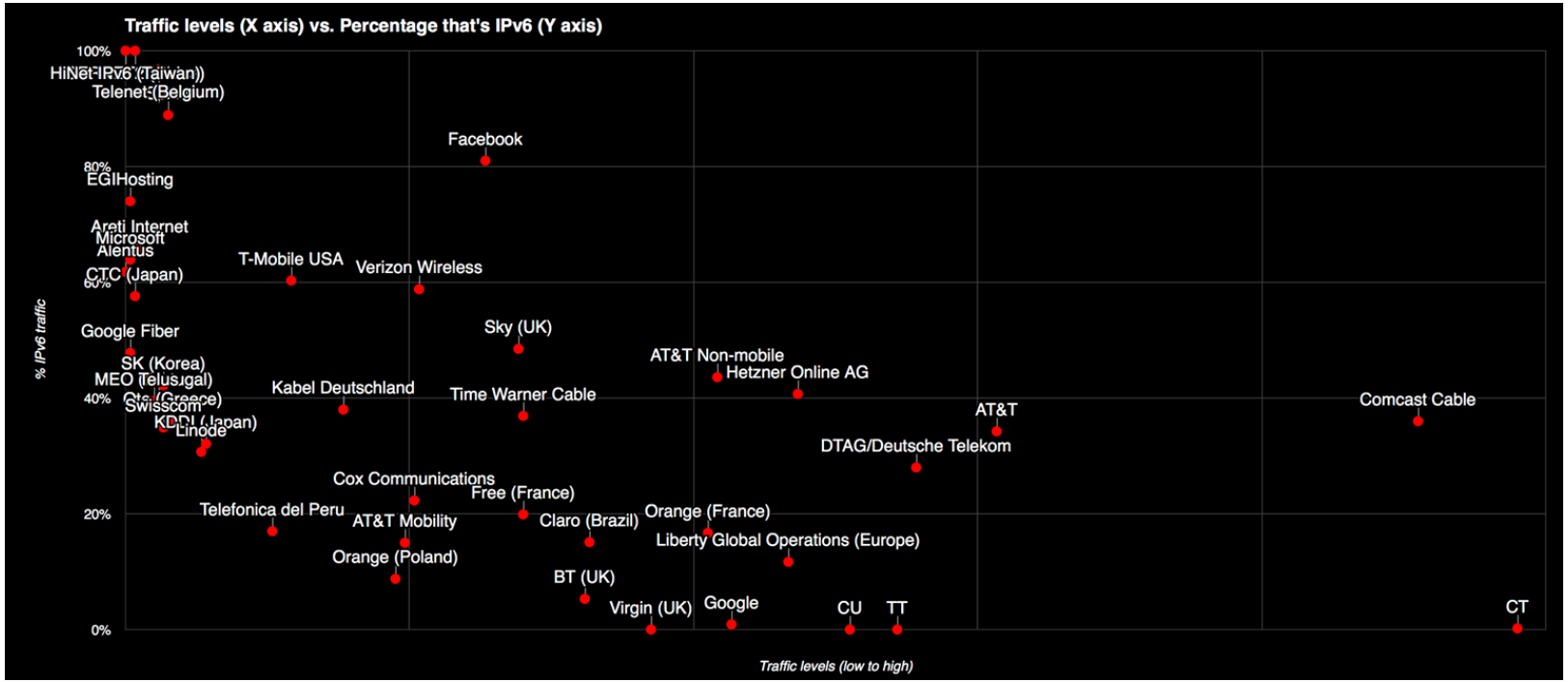
Cloudflare starts process

CLOUDFLARE

https://www.vyncke.org/ipv6status/
https://blog.cloudflare.com/98-percent-ipv6/

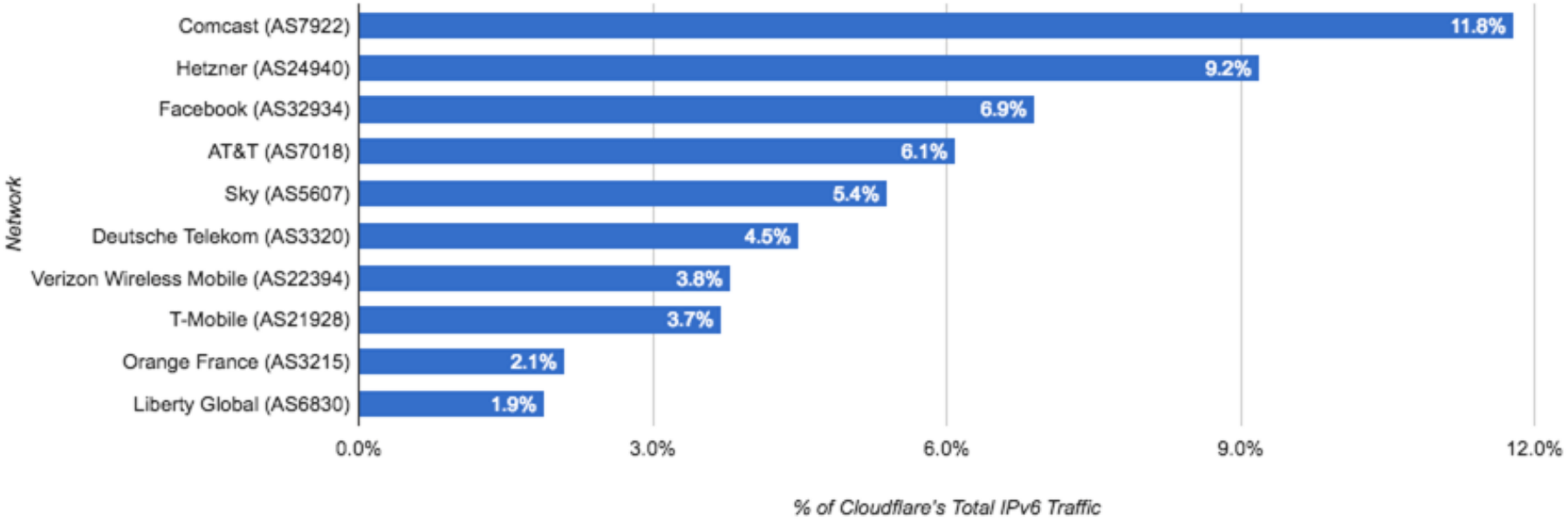
Who and what is driving IPv6?

Percentage of IPv6 vs. bandwidth per network



CLOUDFLARE

Top 10 IPv6 (~55% of Cloudlfare IPv6 Traffic)

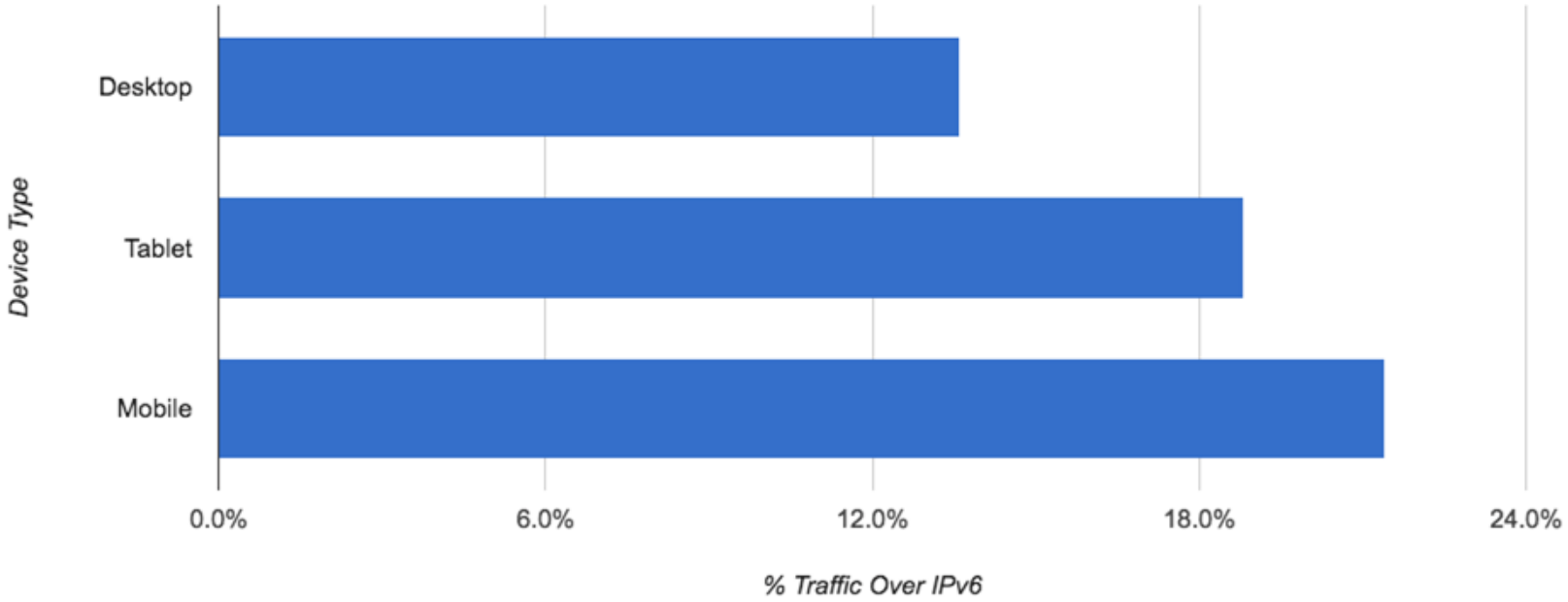


CLOUDFLARE

1	100.0%	Orange Polska
2	100.0%	China Next Generation Internet CERNET2
3	100.0%	HiNet IPv6 (Taiwan)
4	96.8%	Telenet (Belgium)
5	91.5%	Time Warner Cable
6	88.9%	Sprint
7	81.0%	Facebook
8	74.0%	EGIHosting
9	65.9%	Areti Internet
10	63.9%	Microsoft

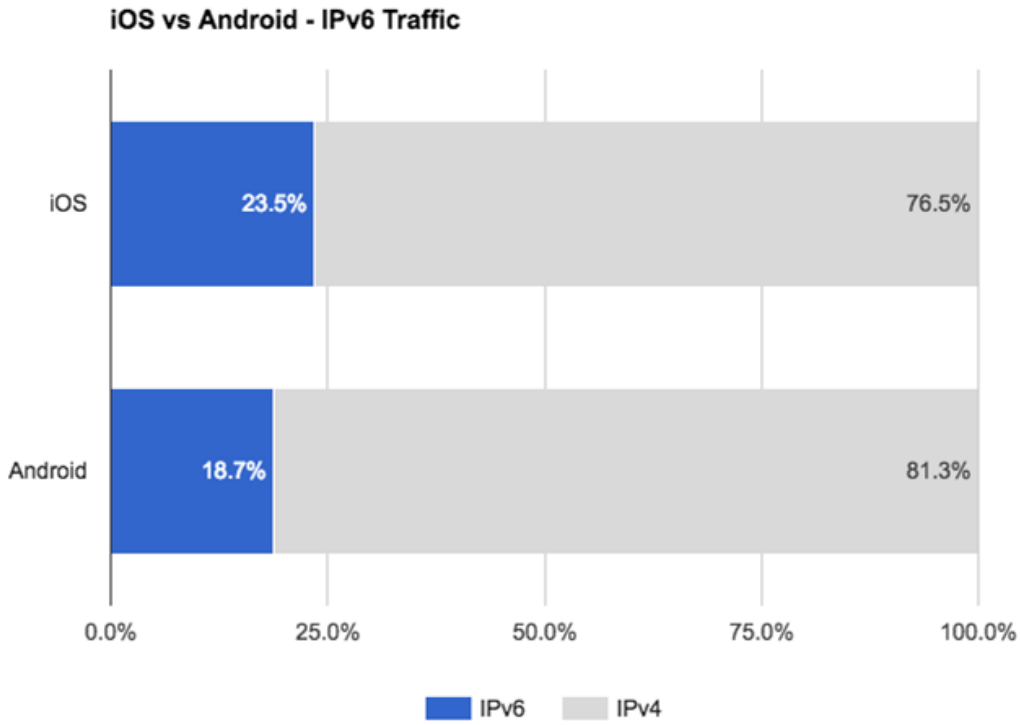
11	61.8%	Alentus
12	60.3%	T-Mobile USA
13	58.8%	Verizon Wireless
14	57.6%	Chubu Telecommunications Company
15	48.5%	Sky (UK)
16	47.8%	Google Fiber
17	44.6%	AIS Fibre (Thailand)
18	43.6%	AT&T
19	43.3%	Hughes Network Systems
20	43.2%	wilhelm.tel GmbH Norderstedt

IPv6 by Device Type



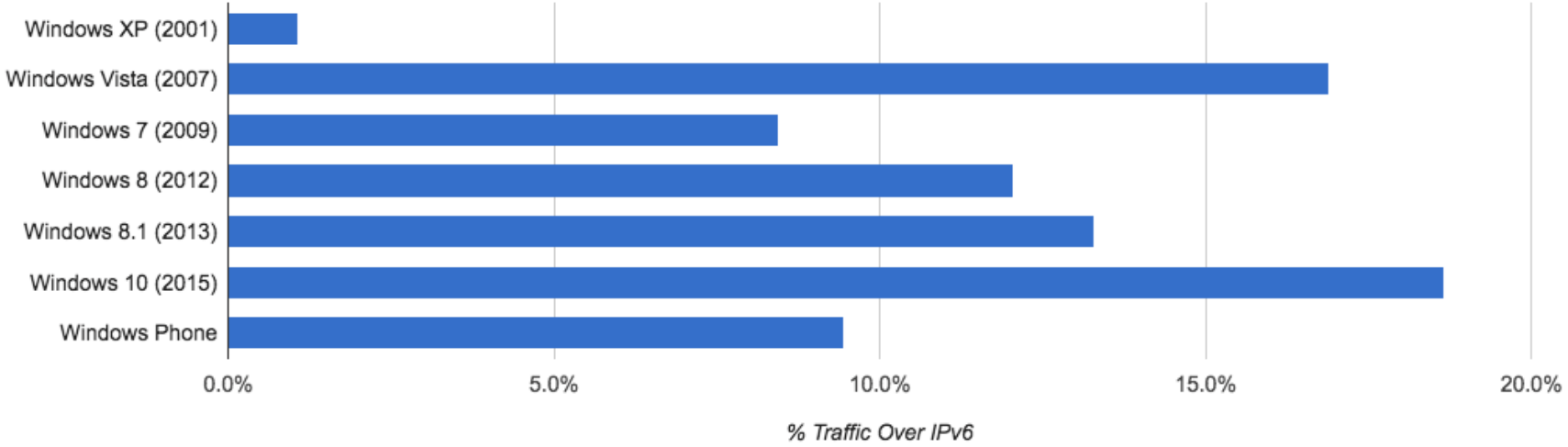
CLOUDFLARE

iOS vs Android



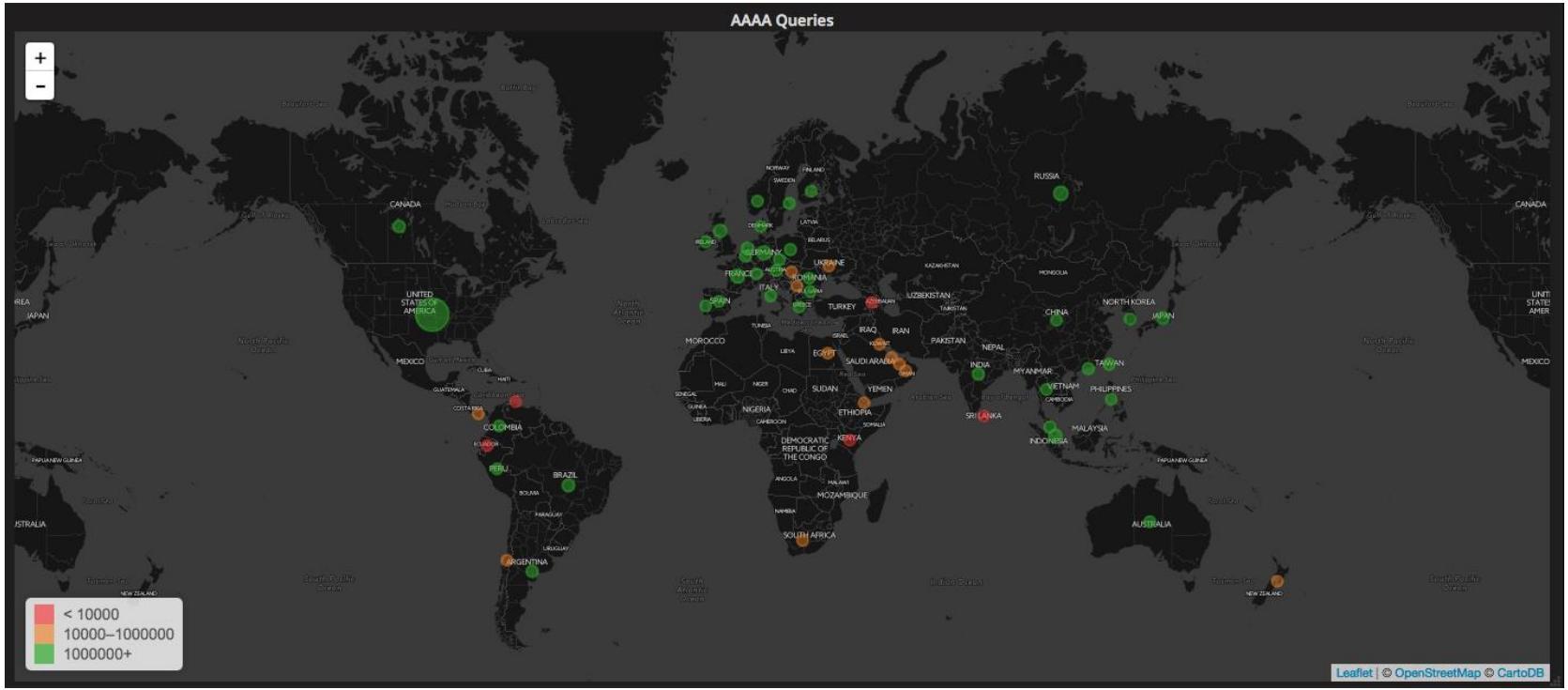
CLOUDFLARE

Windows and IPv6



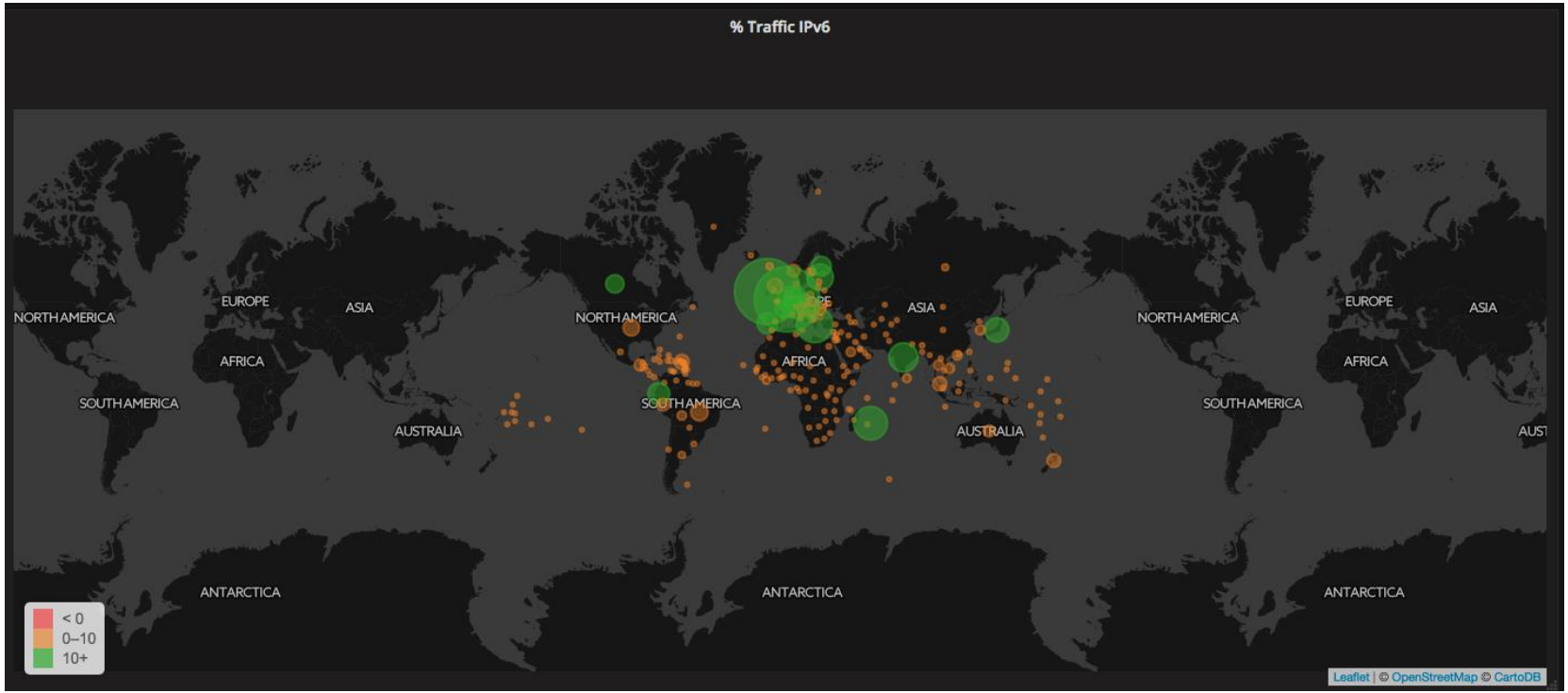
CLOUDFLARE

IPv6 global map (AAAA queries)



CLOUDFLARE

IPv6 global map (% Traffic IPv6)



CLOUDFLARE

What’s next for IPv6? Fix DNS!

A & AAAA records - how silly is this in 2017?

- Separate A & AAAA records
- In a happy-eyeball environment we still need two DNS queries (before any TCP connection can be instigated)

Query for A record

Header	QR AA RCODE=NOERROR
Question	www.example.com IN A
Answer	www.example.com. IN A 192.0.2.1
Authority	<empty>
Additional	<empty>

Query for AAAA record

Header	QR AA RCODE=NOERROR
Question	www.example.com IN AAAA
Answer	www.example.com. IN AAAA 2001:db8::1
Authority	<empty>
Additional	<empty>

CLOUDFLARE

AAAA for free (when doing an A query)!

Cloudflare proposed solution:

1. A + AAAA in new meta-query
2. Resolver asks for A or AAAA
3. If positive answer, the resolver then checks AAAA + A meta-query
4. Resolver remembers whether authoritative server supports meta-query for future queries
5. Resolver adds both A and AAAA to cache

Want to try it?

```
$ dig cloudflare.com @ns1.cloudflare.com -t TYPE65535 +short
198.41.215.162
198.41.214.162
2400:cb00:2048:1::c629:d6a2
2400:cb00:2048:1::c629:d7a2
$
```

This is live - try it with any domain on Cloudflare.

```
$ dig taylorswift.com @ashley.ns.cloudflare.com -t
TYPE65535 +short
104.16.193.61
104.16.194.61
104.16.191.61
104.16.192.61
104.16.195.61
2400:cb00:2048:1::6810:c33d
2400:cb00:2048:1::6810:c13d
2400:cb00:2048:1::6810:bf3d
2400:cb00:2048:1::6810:c23d
2400:cb00:2048:1::6810:c03d
$
```

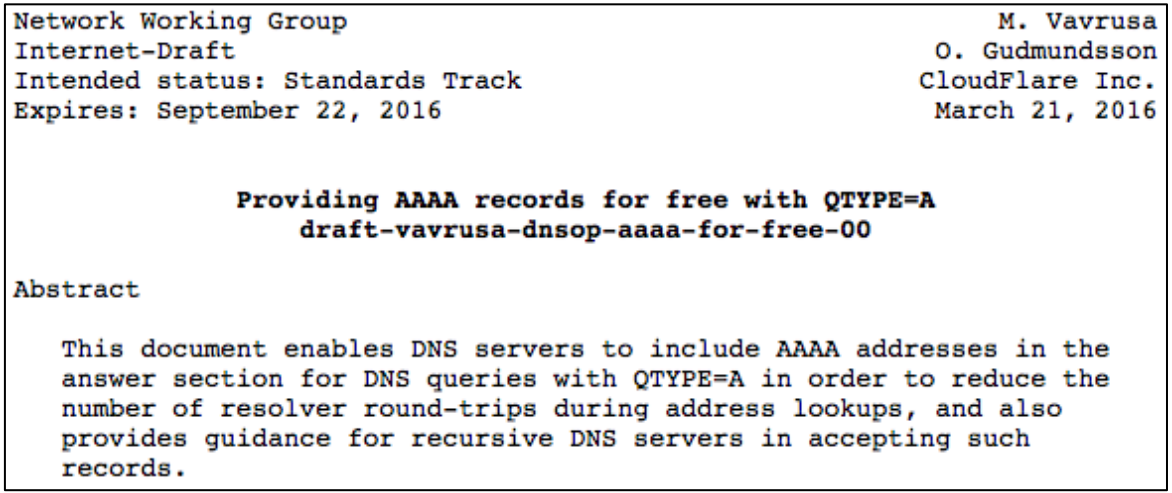
weLove SHOPPING .COM

```
$ dig weloveshopping.com @adel.ns.cloudflare.com -t
TYPE65535 +short
61.90.201.137
61.90.201.138
$
```

CLOUDFLARE

IETF draft – pick one, any one (maybe ours?)

https://tools.ietf.org/html/draft-vavrusa-dnsop-aaaa-for-free-00
https://tools.ietf.org/html/draft-yao-dnsop-accompanying-questions-02
https://tools.ietf.org/html/draft-bellis-dnsext-multi-qtypes-03



Network Working Group — M. Vavrusa
Internet-Draft — O. Gudmundsson
Intended status: Standards Track — CloudFlare Inc.
Expires: September 22, 2016 — March 21, 2016

Providing AAAA records for free with QTYPE=A
draft-vavrusa-dnsop-aaaa-for-free-00

Abstract

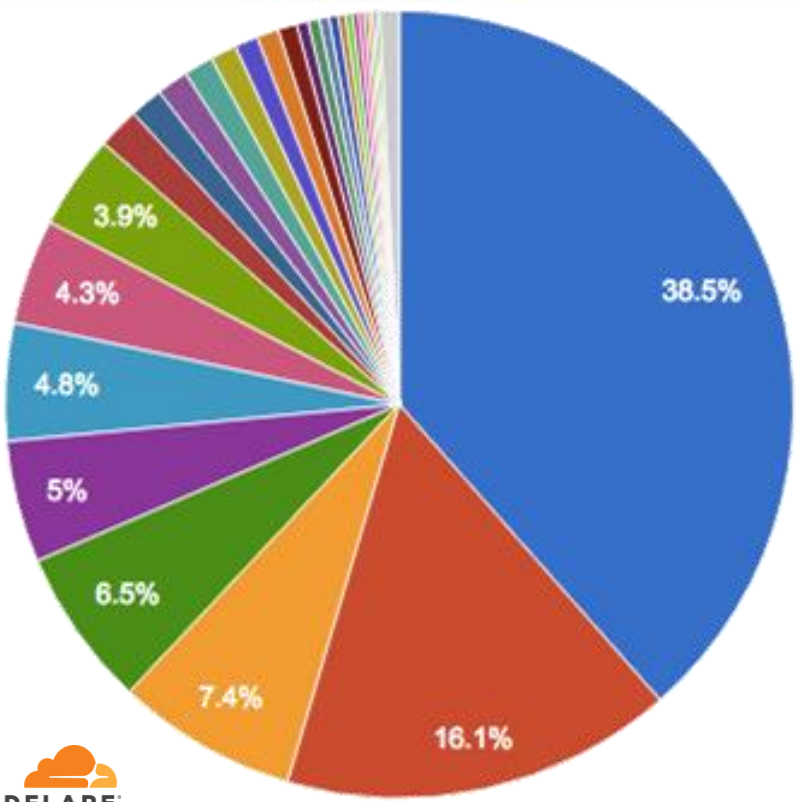
This document enables DNS servers to include AAAA addresses in the answer section for DNS queries with QTYPE=A in order to reduce the number of resolver round-trips during address lookups, and also provides guidance for recursive DNS servers in accepting such records.

https://tools.ietf.org/html/draft-vavrusa-dnsop-aaaa-for-free-00

CLOUDFLARE

DNS – why it’s so very important

Market share of top 1M sites in Alexa (for DNS)



- CloudFlare DNS
- Route 53
- 123-reg DNS
- DNSPod
- Dyn Managed DNS
- DNS Made Easy
- TransIP
- RackSpace DNS
- Jimdo DNS
- EasyDNS
- ZoneEdit
- DNSimple
- UltraDns
- CSC Corporate Domains
- Binero
- NetNames
- AT&T DNS
- Verisign
- Akamai DNS
- MarkMonitor
- Zerigo
- Melbourne IT

CLOUDFLARE

Summary

Thank you!

martin@cloudflare.com

@mahtin / @cloudflare