IPv6 will be the *faster* option
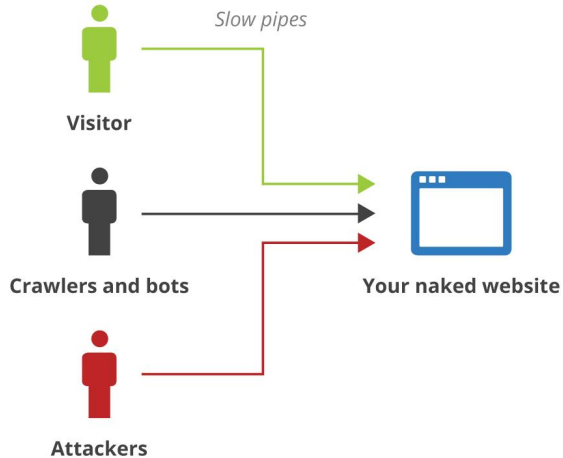
Dani Grant | dani@cloudflare.com | @thedanigrant

Agenda

- Who is CloudFlare?
- IPv6 and CloudFlare
- Making IPv6 even faster

CLOUDFLARE
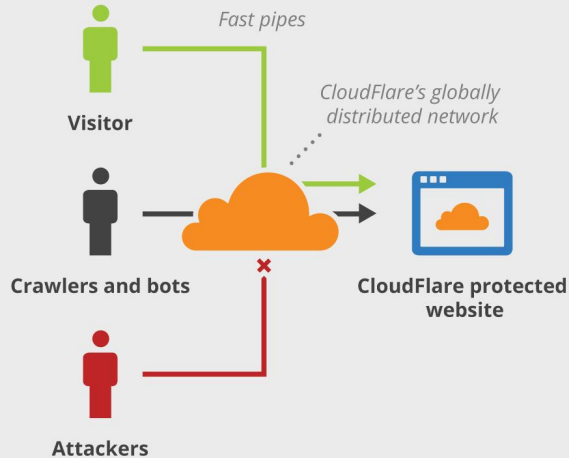
Who is CloudFlare?

CloudFlare speeds up and protects over 4,000,000 websites + APIs.
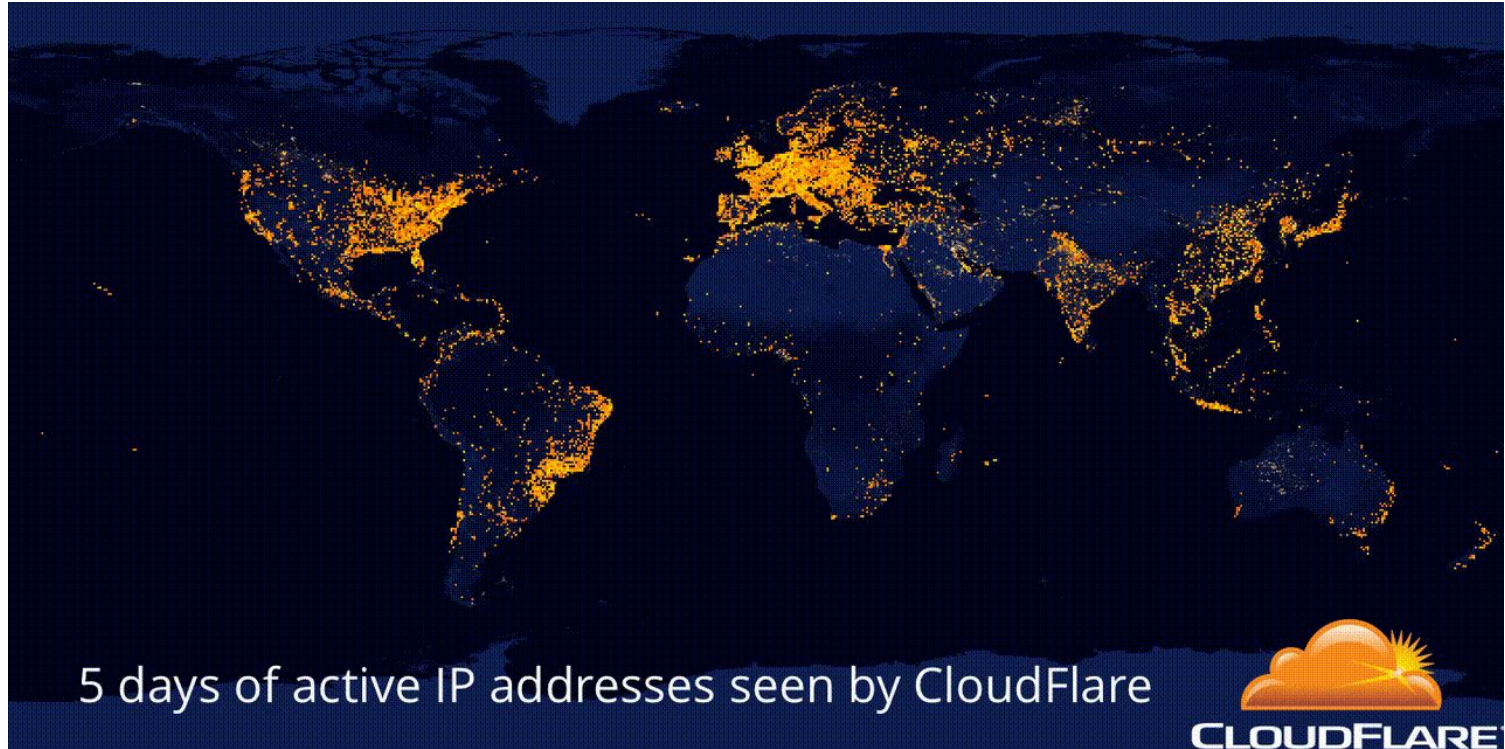
CloudFlare: How It Works

- Traffic proxied through CloudFlare
- Optimizes web content so visitors get the fastest page load
- Dynamically blocks attack traffic

We Run Anycast

1 billion unique IP's weekly

5 days of active IP addresses seen by CloudFlare

No. of IPv6 (/64 masked) crossed IPv4 in June
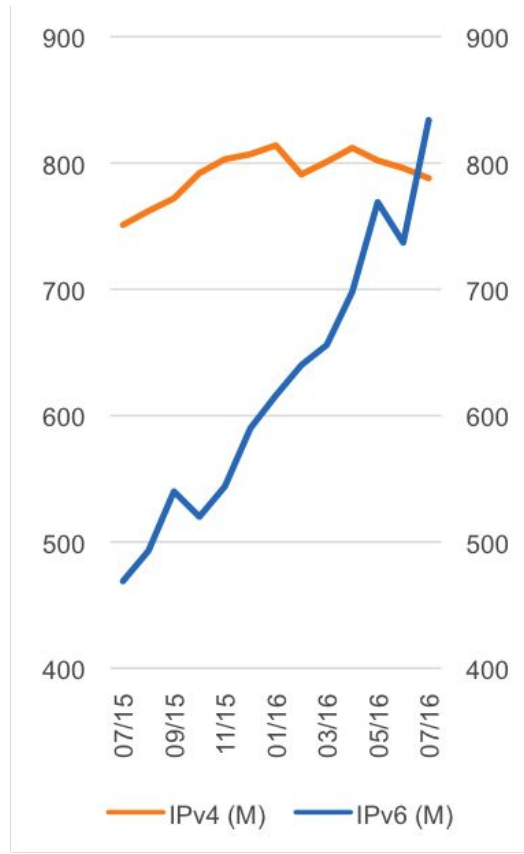
CloudFlare Legal Counsel

Kenneth R. Carter
@carterkr

I must be in Silicon Valley. #PulverHWC

RETWEETS 18   LIKES 21

5:56 PM - 18 May 2016

CloudFlare CTO

IPv6

John Graham-Cumming to Engineering ⇅   May 24

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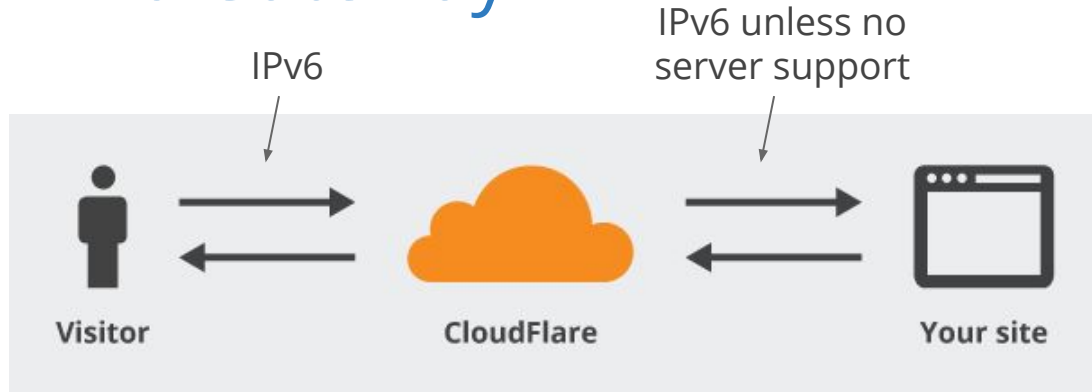IPv6 IPv6 IPv6 IPv6 IPv6 IPv6 IPv6 IPv6 IPv6 IPv6 IPv6
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CLOUDFLARE

```
$ dig http2.cloudflare.com aaaa +short
2604:a880:800:10:5ca1:ab1e:f4:e001
```

IPv6 Gateway

IPv6

IPv6 unless no
server support

Visitor   CloudFlare   Your site

- Even if the origin server can't handle IPv6, CloudFlare can take inbound IPv6 connections and proxy them over v4

Default On IPv6

Thoughts

Can we move towards an "always on" IPv6?

One day…maybe…

Overview Analytics DNS Crypto Firewall Speed Caching Page Rules Network Traffic Customize Apps Scrape Shield

Network
Manage network settings for your website

IPv6 Compatibility

Enable IPv6 support and gate

This setting was last changed a few s

Hark! Thou hast turn IPv6 off

Thou art making thy way backeth into the internet dark ages.
We'll misseth thee from yonder on the IPv6–enabled modern web.
To learneth m're about IPv6, seeth out knowledge base.

Closeth

API ▸   Help ▸

WebSockets

Allow WebSockets connections to your origin server.

Off

Off

Network Working Group   L. Howard
Internet-Draft   Time Warner Cable
Intended status: Standards Track   March 14, 2016
Expires: September 15, 2016

                        IPv4 Declared Historic
                  draft-howard-sunset4-v4historic-00

Abstract

   IPv4 has been superseded by IPv6, and is therefore Historic.

What if IPv6 was the *faster* option?

- Some software already adding artificial delays to IPv4 traffic

CLOUDFLARE

Apple - 25ms delay

[v6ops] Apple and IPv6 - Happy Eyeballs

- *From*: David Schinazi <dschinazi at apple.com>
- *To*: v6ops at ietf.org
- *Cc*: Paul Saab <ps at fb.com>
- *Date*: Thu, 09 Jul 2015 15:00:40 -0700

```
Hi everyone,

Today Apple released the first public seeds of iOS 9 and OS X El Capitan.
These seeds (and the third developer seeds released yesterday) include an improved version of Happy Eyeballs.
```

"If the first reply we get is A and we're expecting a AAAA, we start a 25ms timer"

CLOUDFLARE

Chrome & Firefox - 300ms delay

[Docs] [txt|pdf] [draft-ietf-v6ops-...] [Diff1] [Diff2] [Errata]

PROPOSED STANDARD
Errata Exist

Internet Engineering Task Force (IETF)   D. Wing
Request for Comments: 6555   A. Yourtchenko
Category: Standards Track   Cisco
ISSN: 2070-1721   April 2012

Happy Eyeballs: Success with Dual-Stack Hosts

"If that connection does not complete within a short period of time (Firefox and Chrome use 300 ms), initiate a connection attempt with the first address belonging to the other address family (e.g., IPv4)."

Making IPv6 even faster

- IPv6 is the future in terms of performance.
- Can we make it even faster?

CLOUDFLARE

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.

AAAA For Free

- Return AAAA records alongside every A answer
- Goal is to pre-populate resolver caches with v6 addresses

For example


```
              +------------------------------------------------+
Header        |              QR AA RCODE=NOERROR               |
              +------------------------------------------------+
Question      |              ns1.example. IN A                 |
              +------------------------------------------------+
Answer        |       ns1.example. IN A 192.0.2.1              |
              |       ns1.example. IN AAAA 2001:db8::1          |
              +------------------------------------------------+
Authority     |                 <empty>                        |
              +------------------------------------------------+
Additional    |                 <empty>                        |
              +------------------------------------------------+
```

Result

- In DNS queries for AAAA, more likely to have an answer in cache
- Especially good for Happy Eyeballs

Challenges

- Resolvers will need to accept both the A and AAAA answer
- One RCODE for combined answer - no way to set RCODE if multiple answers have different RCODEs
- Large DNS answer sizes if both A and AAAA are DNSSEC signed

What do you think?

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

Thanks!

dani@cloudflare.com | @thedanigrant