BKNIX 2017 Bangkok
Cloudflare global and local peering

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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 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
- 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
Enterprise solutions in every vertical

New customer additions in the past 6 months
APAC Customers (a sample)
Cloudflare 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 categories
  • 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!
Bangkok Thailand

• Three dedicated locations within Bangkok
  
  | Jastel | AS45629 |
  | TOT    | AS38040 |
  | AIS    | AS45430 |

• Next up?
  
  | True   | AS7470  |
IPv6 @ Cloudflare
Cloudflare can be a “bridge” to IPv6
Cloudflare can be an IPv6 “bridge”
Cloudflare can be an IPv6 “bridge”
Cloudflare can be an IPv6 “bridge”
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)

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

2 pull requests MERGED
Updated 19/Aug/16 8:13 AM
People (and you know who they are) noticed!

Lee Howard
October 25 at 12:28pm

Somebody’s been enabling IPv6 on lots of web sites in the past few months. From 10% to 17% in just three months.  
http://www.employees.org/~dwing/aaaa-stats/

Vaibhav Bajpai
@bajpaivaibhav

there is rapid growth in number of AAAA websites from 76K (08/2016) to 109K (10/2016) (source @dan_wing dataset: goo.gl/An3iPX )

12:35 AM - 26 Oct 2016
Eric Vyncke’s graph is in its full glory!

Cloudflare hits 98.01%

Cloudflare starts process
Who and what is driving IPv6?
Percentage of IPv6 vs. bandwidth per network
Top 10 IPv6 (~55% of Cloudflare IPv6 Traffic)
<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>100.0%</td>
<td>Orange Polska</td>
</tr>
<tr>
<td>2</td>
<td>100.0%</td>
<td>China Next Generation Internet CERNET2</td>
</tr>
<tr>
<td>3</td>
<td>100.0%</td>
<td>HiNet IPv6 (Taiwan)</td>
</tr>
<tr>
<td>4</td>
<td>96.8%</td>
<td>Telenet (Belgium)</td>
</tr>
<tr>
<td>5</td>
<td>91.5%</td>
<td>Time Warner Cable</td>
</tr>
<tr>
<td>6</td>
<td>88.9%</td>
<td>Sprint</td>
</tr>
<tr>
<td>7</td>
<td>81.0%</td>
<td>Facebook</td>
</tr>
<tr>
<td>8</td>
<td>74.0%</td>
<td>EGIHosting</td>
</tr>
<tr>
<td>9</td>
<td>65.9%</td>
<td>Areti Internet</td>
</tr>
<tr>
<td>10</td>
<td>63.9%</td>
<td>Microsoft</td>
</tr>
<tr>
<td>11</td>
<td>61.8%</td>
<td>Alentus</td>
</tr>
<tr>
<td>12</td>
<td>60.3%</td>
<td>T-Mobile USA</td>
</tr>
<tr>
<td>13</td>
<td>58.8%</td>
<td>Verizon Wireless</td>
</tr>
<tr>
<td>14</td>
<td>57.6%</td>
<td>Chubu Telecommunications Company</td>
</tr>
<tr>
<td>15</td>
<td>48.5%</td>
<td>Sky (UK)</td>
</tr>
<tr>
<td>16</td>
<td>47.8%</td>
<td>Google Fiber</td>
</tr>
<tr>
<td>17</td>
<td>44.6%</td>
<td>AIS Fibre (Thailand)</td>
</tr>
<tr>
<td>18</td>
<td>43.6%</td>
<td>AT&amp;T</td>
</tr>
<tr>
<td>19</td>
<td>43.3%</td>
<td>Hughes Network Systems</td>
</tr>
<tr>
<td>20</td>
<td>43.2%</td>
<td>wilhelm.tel GmbH Norderstedt</td>
</tr>
</tbody>
</table>
IPv6 by Device Type
iOS vs Android

iOS
- IPv6: 23.5%
- IPv4: 76.5%

Android
- IPv6: 18.7%
- IPv4: 81.3%
Windows and IPv6

% Traffic Over IPv6

- Windows XP (2001)
- Windows Vista (2007)
- Windows 7 (2009)
- Windows 8 (2012)
- Windows 8.1 (2013)
- Windows 10 (2015)
- Windows Phone
IPv6 global map (AAAA queries)
IPv6 global map (% Traffic IPv6)
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

<table>
<thead>
<tr>
<th>Header</th>
<th>QR AA RCODE=NOERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td><a href="http://www.example.com">www.example.com</a> IN A</td>
</tr>
<tr>
<td>Answer</td>
<td><a href="http://www.example.com">www.example.com</a> IN A 192.0.2.1</td>
</tr>
<tr>
<td>Authority</td>
<td>&lt;empty&gt;</td>
</tr>
<tr>
<td>Additional</td>
<td>&lt;empty&gt;</td>
</tr>
</tbody>
</table>

Query for AAAA record

<table>
<thead>
<tr>
<th>Header</th>
<th>QR AA RCODE=NOERROR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td><a href="http://www.example.com">www.example.com</a> IN AAAA</td>
</tr>
<tr>
<td>Answer</td>
<td><a href="http://www.example.com">www.example.com</a> IN AAAA 2001:db8::1</td>
</tr>
<tr>
<td>Authority</td>
<td>&lt;empty&gt;</td>
</tr>
<tr>
<td>Additional</td>
<td>&lt;empty&gt;</td>
</tr>
</tbody>
</table>
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
$
```

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

This is live - try it with any domain on Cloudflare.
IETF draft – pick one, any one (maybe ours?)

DNS – why it’s so very important
Market share of top 1M sites in Alexa (for DNS)
Summary
Thank you!

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@mahtin / @cloudflare