Seeing the effects of DNS Flag Day in action

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The issue
The issue
The issue

dns-oarc.net AAAA
EDNS0

Resolver

NO MORE
Resolver: dns-oarc.net AAAA + ENDS0
Auth: 2620:ff:c000::6
DNS flag day

• First announced - March 9, 2018
• Lots of measurements of authoritative
• Lots of outreach
• Lots of authoritatives fixed
• Lots of middle boxes fixed

• Measure resolver uptake after DNS flag day
Already DNS flag day ready

- BIND since 9.13.7 - 2019-02-27
- Unbound since 1.9.0 - 2019-02-05
- Knot since always
- PowerDNS seemed already ready too...

flagday.rootcanary.net
End user perspective

<table>
<thead>
<tr>
<th></th>
<th>Distinct Resolvers</th>
<th>Distinct ASes</th>
</tr>
</thead>
<tbody>
<tr>
<td>RIPE</td>
<td>19,063</td>
<td>3,587</td>
</tr>
</tbody>
</table>


±15% already DNS flag day ready

2019-01-28

flagday.rootcanary.net
End user perspective
RIPE Atlas

Probe/resolver pairs:
- Probes that do flagday
- Do flagday

Graph shows a trend from 2019-02-12 to 2019-05-07.
End user perspective
RIPE Atlas

Probe/resolver pairs

- Remaining
- Telenet N.V.
- XS4ALL Internet BV
- Kabel Deutschland Vertrieb und Service GmbH
- Liberty Global Operations B.V.
- Comcast Cable Communications, Inc.
- Deutsche Telekom AG
- CloudFlare, Inc.
- Google Inc.

RIPE Atlas statistics

- Remaining (40.6%)
- AS6830 (3.4%)
- AS6848 (1.0%)
- AS7922 (4.1%)
- AS3265 (1.4%)
- AS3320 (4.7%)
- AS31334 (1.4%)
- AS13335 (7.2%)
- AS19281 (1.9%)
- AS15169 (34.3%)
End user perspective
RIPE Atlas

1.1.1.1

9.9.9.9

8.8.8.8
**Authoritative perspective**

<table>
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<tr>
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<th>Distinct Upstream IPs</th>
<th>Distinct Upstream ASes</th>
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<tbody>
<tr>
<td>RIPE</td>
<td>62,191</td>
<td>3,824</td>
</tr>
<tr>
<td>Luminati</td>
<td>101,386</td>
<td>8,272</td>
</tr>
<tr>
<td>Open Resolvers</td>
<td>226,563</td>
<td>17,125</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>284,635</strong></td>
<td><strong>19,320</strong></td>
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*.Auth.*

*.flagday.rootcanary.net*
 Autoritative perspective

• For each unique QNAME:
  • if all queries with EDNS:
    All IPs <= STRICT
  • elif at least one query without EDNS0:
    All IPS <= PERMISSIVE

*flagday.rootcanary.net

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Authoritative perspective

>20% already DNS flag day ready
2019-01-31

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Measurement period:
2019-02-01 – 2019-05-08
Authoritative perspective
Strict resolvers over time

% Resolvers

Strict
Permissive

2019-02-01
2019-03-01
2019-04-01
2019-05-01
Authoritative perspective

ASes with most resolvers

[Graph showing the percentage of strict resolvers over time for various ASes: CLOUDFLARENET, GOOGLE, COMCAST, LEVEL3, OVH, FR, CHINANET, MICROSOFT, CHINA169, HINET Data Communication Business Group, TW, VERISIGN.]
Authoritative perspective

Revert

- With at least 500 queries per day on median
- Increase in "strict" queries by at least 25% compared to the median of the 7 days before
- Decrease in strict queries to the pre-growth median
**Takeaways**

- The Internet became a little better!
- If your auth dropped EDNS0, you were already in pretty bad shape!
- Besides Google (and Quad9 since May), not much happened after flag day
- Do these kind of impact measurement before outreach next time