

IPv6 Adoption Across .uk

How has IPv6 adoption grown across the .uk TLD since the previous analysis

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Why Assess IPv6 Adoption for a TLD?

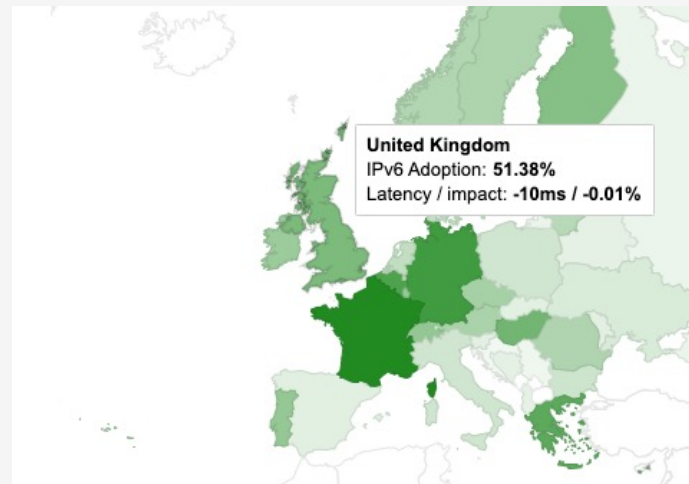
Google's stats are often used as a measure of overall IPv6 uptake:

- Implies three things: the user's device, the networking path and the service support IPv6.
- Are websites/services the bottleneck for IPv6 adoption? If so, why?

What is the uptake of IPv6 like in the .uk TLD?

- Little research for .uk...
- 0.82% of .gov.uk had IPv6 in 2015.
- 7.36% of Alexa's top 500 UK sites had IPv6 in 2015.

Time to get probing!



How Did We Collect the Data?

.uk TLD is managed by Nominet - we politely asked them for access.

- Combined Nominet's zone file with openly available lists of .gov.uk (5,547) and .ac.uk (5,559) domains.
- Result: 10.23 million domains (.uk, .co.uk, .org.uk, .me.uk, .sch.uk, .ltd.uk, .net.uk, .plc.uk, gov.uk, ac.uk)

Based on NIST's former IPv6 measurement methodology:



A / AAAA Records

Query A and AAAA at the apex for every domain.

Query A and AAAA for www.<domain> for every domain.



NS Records

For every domain with an AAAA on the apex or www., resolve NS records.

Query AAAA for each nameserver.



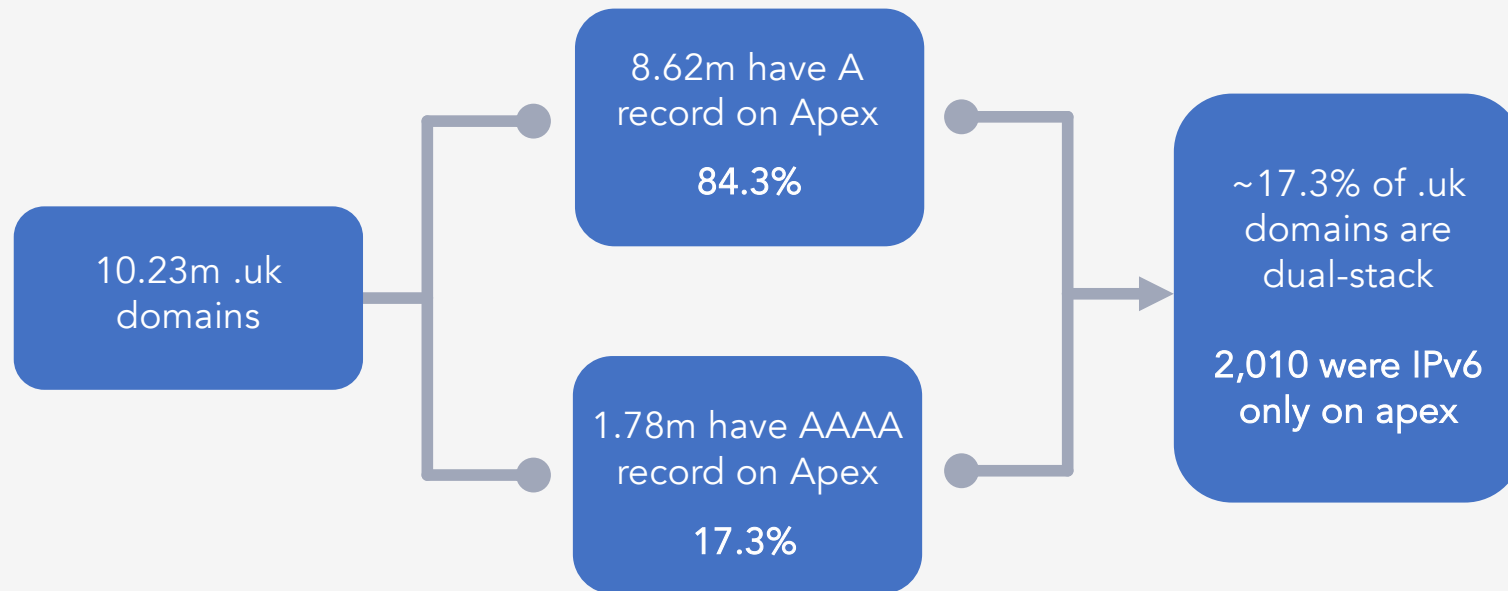
MX Records

For every domain with an AAAA on the apex or www., resolve MX records.

Query AAAA for each mail server.

What did we find?

High level IPv4/IPv6 prevalence across .uk domains (apex only).



More Detail – IPv6 Prevalence for www.



Difference between AAAA rate on apex and www. vs combined?

- 28,159 had AAAA on www. but not on apex.
- 382,617 had AAAA on apex but not on www.
- 420,776 difference, we still assess the full IPv6 capability of the stack.
- We found that **1,773 domains were IPv6-only on www.**

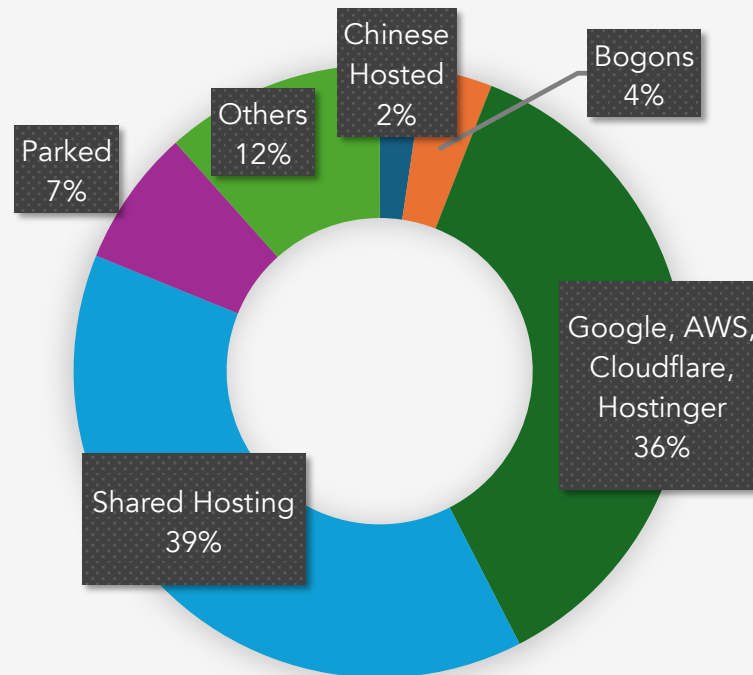
Many sites use www. as the entry point, but not all do.

IPv6-Only .uk Domains

In total 2,085 domains are IPv6-only (no A on apex or www.)

Would we expect IPv6-only sites in the UK today?

- Website would be “invisible” to a large percentage of users in the UK
- Hypothesis: Misconfigs, test hosts, experiments, intentional?
- Bogon Breakdown (most common):
 - 57 Unique Local Unicast (fc00::7)
 - 7 Link Local Unicast (fe80::/10)
 - 6 IPv4-Mapped (::ffff:0:0/96)



Name Servers & Mail Servers (IPv6 Readiness)

We looked at 1.8m domains that have AAAA record on apex or www.

- These domains “support IPv6” for the website, but their name and mail servers?

Metric	Count	% of Scoped Domains	% of All Domains**
At least one NS with an AAAA	1,043,219	57.8%	10.2%
At least one MX with an AAAA	284,116	15.7%	2.8% - may be much higher!
At least one NS and MX with an AAAA	205,963	11.4%	2%
AAAA on apex, www, one NS and one MX	107,440	6%	1%

IPv6 adoption depends heavily on provider support.

IPv6 by Sub-TLD: .gov.uk & .ac.uk

.gov.uk: 5,547 domains

Metric	Count	% of domains
AAAA on apex or www.	1,761	31.7%
At least one NS with an AAAA	971	17.5%
At least one MX with an AAAA	625	11.3%
At least one NS and MX with an AAAA	472	8.5%
AAAA on apex, www, one NS and one MX	412	7.4%

.ac.uk: 5,559 domains

Count	% of domains
308	5.5%
276	5%
161	2.9%
147	2.6%
96	1.7%

Comparison to stats from 2015 "UK IPv6 Readiness Study":

- 31.7% of .gov.uk have AAAA on apex or www. compared to 0.82% back in 2015

Does .uk Help or Hurt Google's Numbers?

We analysed the Majestic top 50k sites – “Sites that are important”:

- Filtered down to 1,091 .uk domains e.g., bbc.co.uk, eventbrite.co.uk, nhs.uk
- Previous analysis stated 7.36% of Alexa's top 500 UK sites had IPv6 in 2015.
- PROBLEM: Alexa no longer exists, but if we take a larger chunk of important domains the percentages will most likely be comparable.

Metric	2015	2025
AAAA on apex or www.	7.36%	45.6%
AAAA on apex and www.	?	20.8%

So... Help or Hurt?

- UK IPv6 usage ranges from 47% to 51%; the important .uk site percentage is 45.6%.
- **Verdict: Help.** This study has a refined scope of www. and apex. Does not include other avenues for IPv6 connectivity.

Findings Overview

Metric	% of .uk Domains
AAAA on apex	17.3%
AAAA on apex and www.	13.6%
At least one NS with an AAAA	10.2%**
At least one MX with an AAAA	2.8%**
At least one NS and MX with an AAAA	2%**
AAAA on apex, www, one NS and one MX	1%**

** MX and NS tests only performed if domain had AAAA on www. or apex. Will be higher if all subdomains are tested.

Comparisons:

0.82% of .gov.uk in 2015



31.7% of .gov.uk

7.36% of top 500 .uk sites in 2015



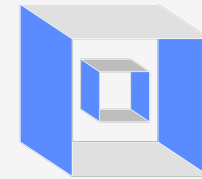
45.6% of most important .uk

Ask service providers about MX IPv6 support.

Future and Thank You

What do we do next?

- In the process of launching a new website, might integrate the high-level stats a bit like Google's format.
- We could run this for other ccTLD/TLD, let's have a chat.
- CNAMEs – more analysis to follow on LinkedIn.
- What are your thoughts and ideas?



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