Update on IPv6 Performance Data

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MAPRG
Methodology

What’s new in this data?

• Old RTT data only tracked TCP connection establishment latency

• New data also captures smoothed RTT values observed by TCP over entire connection lifetime

Data in this presentation was collected over the course of one month (February 2018) on a random sample of 0.1% of connections
**IPv6 Availability**

*Percentage of connections made on a network that offered IPv6 connectivity*

<table>
<thead>
<tr>
<th></th>
<th>Wi-Fi</th>
<th>Cellular</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Global</strong></td>
<td>29%</td>
<td>44%</td>
</tr>
<tr>
<td><strong>US</strong></td>
<td>39%</td>
<td>87%</td>
</tr>
<tr>
<td><strong>UK</strong></td>
<td>32%</td>
<td>0.12%</td>
</tr>
</tbody>
</table>
Global RTT Values

- IPv6 TCP Handshake
- IPv4 TCP Handshake
- IPv6 Connections
- IPv4 Connections

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US Wi-Fi RTT Values

IPv6 TCP Handshake
IPv6 Connections
IPv4 TCP Handshake
IPv4 Connections

IPv6 14%
IPv4 86%

CDF
0% 25% 50% 75% 100%
<25ms <50ms <100ms <150ms <200ms <250ms <300ms <350ms <400ms <450ms <500ms
US Cellular RTT Values

- IPv6 TCP Handshake
- IPv4 TCP Handshake
- IPv6 Connections
- IPv4 Connections

CDF

IPv6

IPv4

60%

40%

0% 25% 50% 75% 100% 25ms 50ms 75ms 100ms 125ms 150ms 175ms 200ms 225ms 250ms 275ms 300ms 325ms 350ms 375ms 400ms 425ms 450ms 475ms 500ms

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US Cellular RTT Values
Subtracting carrier with slowest IPv6

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UK Wi-Fi RTT Values

IPv6 Connections vs IPv4 Connections

- IPv6 TCP Handshake
- IPv4 TCP Handshake
- IPv6 Connections
- IPv4 Connections

CDF

- <25ms
- <50ms
- <75ms
- <100ms
- <125ms
- <150ms
- <175ms
- <200ms
- <225ms
- <250ms
- <275ms
- <300ms
- <325ms
- <350ms
- <375ms
- <400ms
- <425ms
- <450ms
- <475ms
- <500ms

IPv6 11%
IPv4 89%
UK Cellular RTT Values

- IPv6 TCP Handshake
- IPv6 Connections
- IPv4 TCP Handshake
- IPv4 Connections

CDF

- IPv6 0.02%
- IPv4 99.98%
Observations

TCP handshake latency ($RTT_H$) is generally a good predictor of connection RTT ($RTT_C$)

- On Wi-Fi, $RTT_H > RTT_C$
- On Cellular, $RTT_H < RTT_C$

Wi-Fi IPv6 $RTT_C$ is generally lower than IPv4 Cellular $RTT_C$ values are more polarized, by carrier

UK Cellular has extremely low IPv6 penetration, and what little is measured hints at poor performance