A Browser’s Perspective

Surprises and insights from Firefox networking telemetry.

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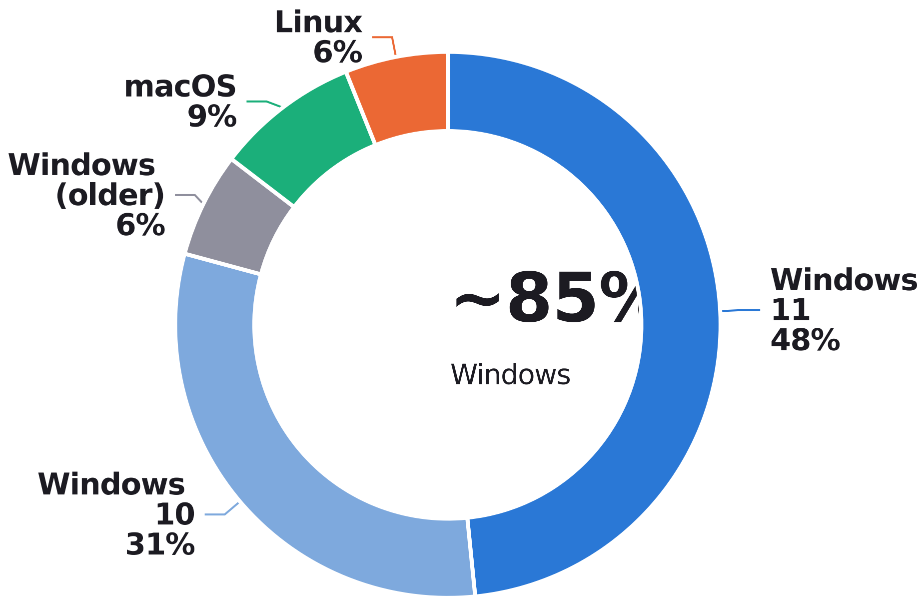
A client-side vantage point, at scale

- Firefox reports anonymized networking telemetry from **~200M** monthly active users (Firefox Public Data Report).
- The **client side**, across the globe: it complements server-side and active-probing datasets.
- Congestion control, path characteristics, QUIC adoption, Happy Eyeballs v3, and more.
- Collected and aggregated with Glean. The **low-resolution** aggregate is **entirely public**: anyone can query it on GLAM. **High-resolution** data can be requested.

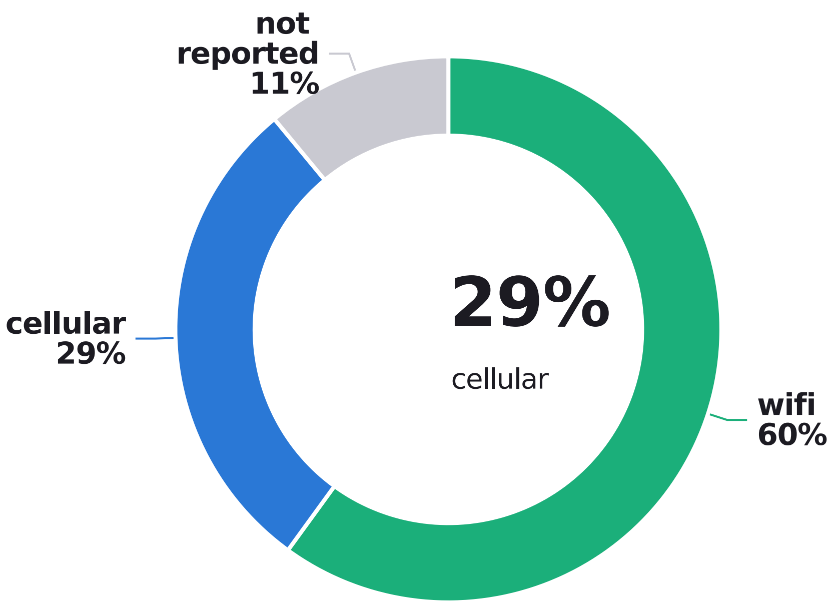
On desktop, a long tail of old machines



- Windows dominates (**~85%**: Win 11 ~48%, Win 10 ~31%); macOS ~8%, Linux ~6%.
- A real tail of old and small machines: **~7%** run a **32-bit** OS, a quarter have only **2 CPU cores**, ~11% just **4 GB** of RAM.

Firefox desktop OS mix. Firefox Hardware Report (2026-07).

On mobile, a third of traffic is cellular



- On Android: **~60%** wifi, **~29%** cellular, the rest unreported.
- Cellular paths bring higher and more variable RTT, more loss, and NAT rebinding: the hard cases cluster here.

Firefox Android navigations by network type.
performance.mozilla.org (7-day avg).

IPv6 still lags

~20%

of HTTP requests
go over IPv6

- **IPv6** is still a minority: only **~20%** of HTTP requests go over it, even at global client scale (GLAM: connection_address_type, release, by HTTP request).

HTTPS is nearly universal

~89%

of page loads
use HTTPS

- **~89%** of Firefox desktop page loads are over **HTTPS**; only ~5% are plain HTTP, plus ~6% HTTP to local domains (performance.mozilla.org).
- Transport encryption is effectively universal. What is still in the clear is the **metadata**, above all the SNI, which is exactly what ECH closes (next slide).

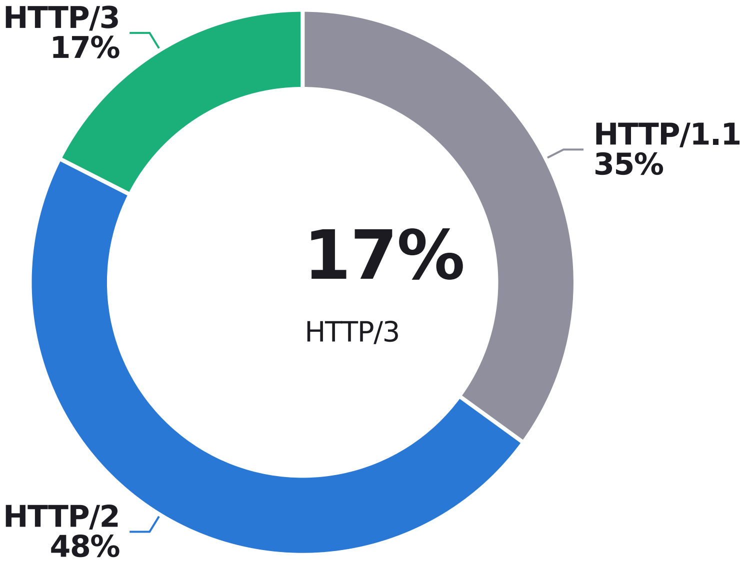
ECH is barely deployed

~1%

of connections
negotiate real ECH

- **Real ECH** is negotiated on only **~0.3%** of TLS handshakes (**~1.4%** of HTTP/3); almost everything else is GREASE (ssl_handshake_result_ech, http3_ech_outcome).
- The ceiling is the **~16%** of HTTPS records that carry an ECH config (https_rr_features, Nightly).

HTTP/3 is ~17% of page loads

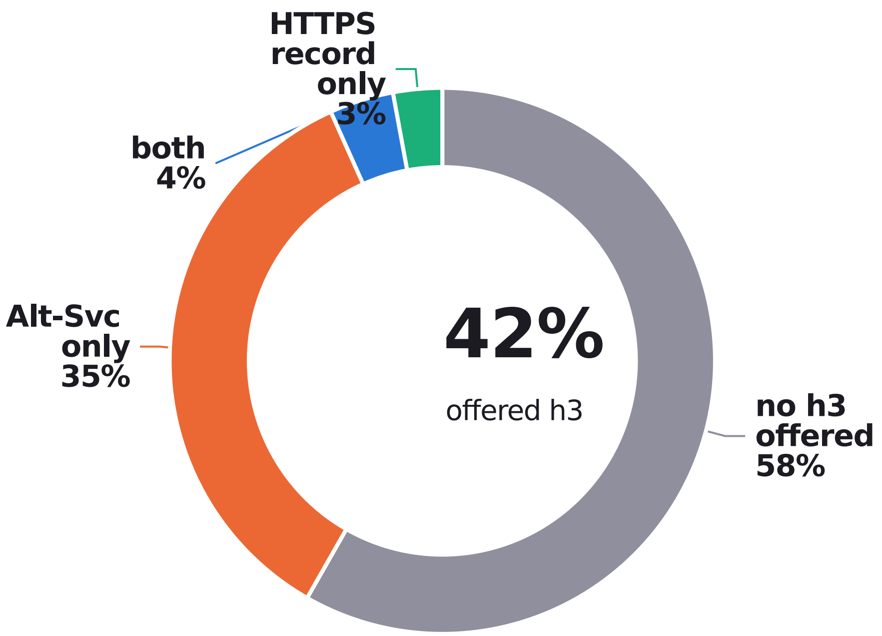


- Desktop top-level page loads: **HTTP/2 ~47%**, **HTTP/1.1 ~35%**, **HTTP/3 ~17%**.
- The surprise: **HTTP/1.1 is far from dead**, still ~35% of page loads.
- This counts only the **main document**. Per-request counts, inflated by ad and tracker subresources, put HTTP/3 nearer **~30%** (Cloudflare Radar).

HTTP version of Firefox desktop top-level page loads.
performance.mozilla.org.

How connections find HTTP/3

Firefox Nightly

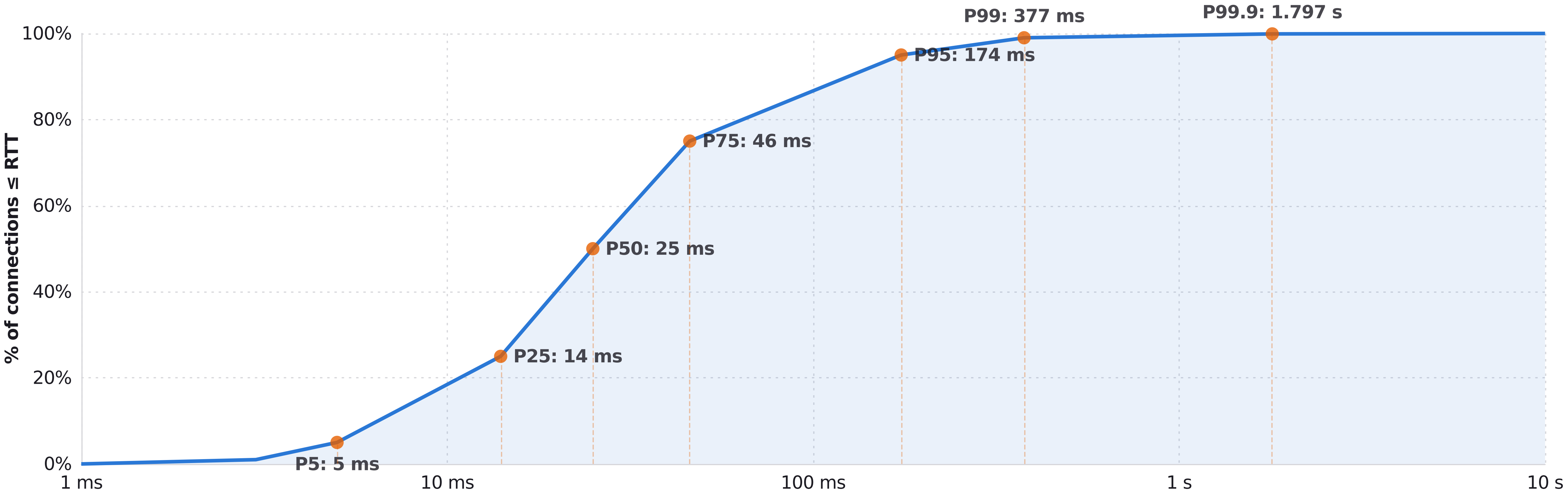


- **~84%** of connections offered h3 learn it **only from Alt-Svc**, so after a first non-h3 connection: a wasted round trip.
- An **HTTPS record** would move that discovery into DNS, before connecting, but almost nobody publishes one (check any domain at savearoundtrip.com).
- Once on HTTP/3, a new metric tracks **QUIC v1 vs v2**: **~100% v1** today, v2 not yet negotiated at scale (http_3_quic_version, Nightly).

How Firefox connections learn h3. GLAM (Nightly).

QUIC round-trip times, from the client

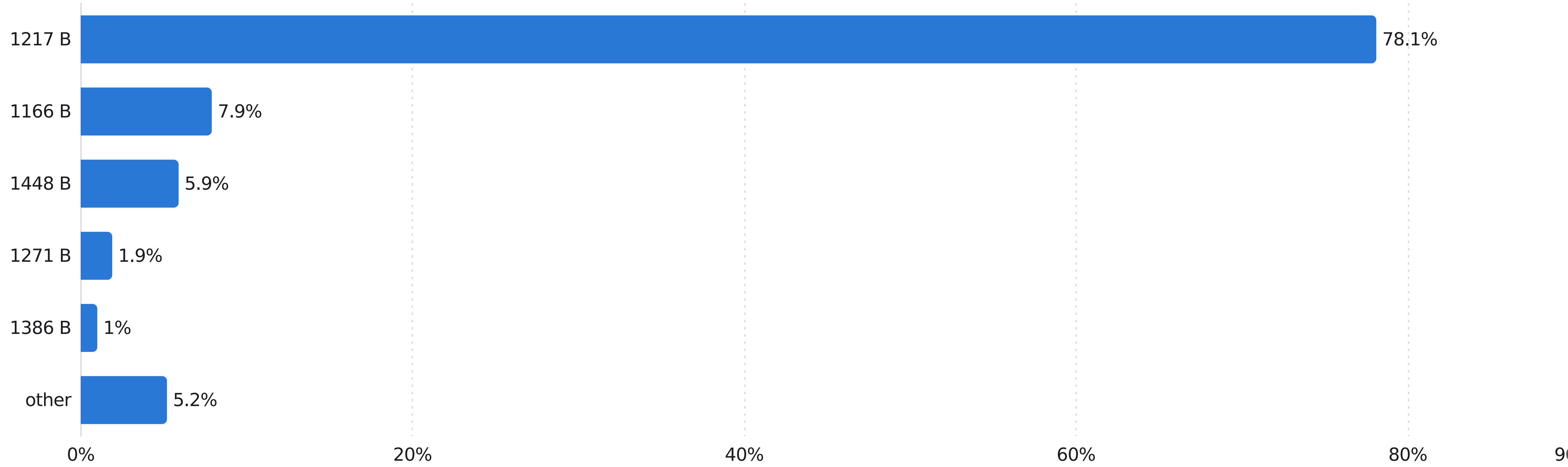
Firefox Nightly



Cumulative distribution of smoothed RTT (log x); dots are GLAM's percentiles. GLAM: networking_http_3_rtt (Nightly).

A steep rise from ~10 to ~50 ms, then a long tail out toward ~2 s.

Reading server MTUs from the client



Received QUIC datagram size (top sizes by share), i.e. the size the server sends at. GLAM: udp_datagram_segment_size_received (release).

78% of servers send at exactly **1217 B**, a conservative QUIC-safe size; only **~6%** reach **1448 B**, near the 1500-byte Ethernet MTU. Servers cluster at a few discrete MTUs and mostly leave PMTUD headroom on the table.

Most connections never send fast

~6.5%

of connections ever grow
their congestion window

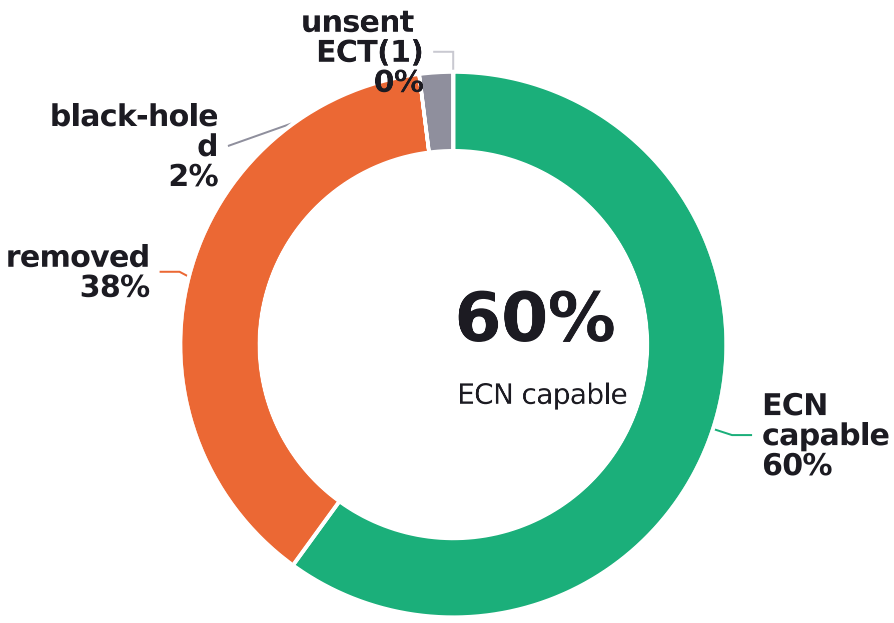
~5–6%

of those
exit slow start

- The median connection never even registers a **congestion event**: **0** at P50, **1** at P95 and P99, and **6** at P99.9. Almost nothing ever pushes the path hard enough to see loss or a CE mark.

GLAM: congestion_window_growth, slow_start_exited_filtered, congestion_event_count (release).

ECN works on most paths



ECN marks on a QUIC connection's path. GLAM: ecn_path_capability (release).

- **~60%** of QUIC connections see working ECN end to end; ~38% have marks **removed**, only **~2%** black-holed.
- On release, **~15%** of congestion responses come from a **CE mark**, not packet loss (the other **~85%** from loss) (GLAM: congestion_event_reason).
- A **CE** mark signals congestion **without a drop**: no retransmit, and no ~1-RTT send gap while loss recovery kicks in.
- Firefox backs off **less** on a CE mark than on loss, per RFC 8511 (Alternative Backoff with ECN).

And we observe the ECN receive path, too

Firefox Nightly

- We have new telemetry (GLAM) for our ECN **receive path**, so we observe what the server sees.
- Those are the first results, just in today, **normalized by client**:
  - **3.96%** of connections have marked **ECT(0)**.
  - **0.76%** see **ECT(0)** and **ECN-CE**.
  - **0.17%** marked **ECT(1)**.
  - **0.02%** see **ECT(1)** and **ECN-CE**.

Query it yourself

DISTRIBUTIONS

glam.telemetry.mozilla.org
Aggregated views per probe. No login.

DASHBOARDS

performance.mozilla.org/networking.html
Curated views for Desktop and Android.

DEFINITIONS

searchfox.org → netwerk/metrics.yaml
Every metric defined in the open.

REPORTING

data.firefox.com
User Activity and Hardware across the web.

Bring a research question and add a browser vantage point. We are happy to help you find the right probe: Oskar Mansfeld (omansfeld@mozilla.com), Max Inden (mail@max-inden.de).