Happy Eyeballs v3 in Firefox

Max Inden - Mozilla - IETF 125

Available in Firefox Nightly

You can try it out by:

1. Installing Firefox Nightly
2. Enabling Happy Eyeballs v3 by visiting `about:config` setting `network.http.happy_eyeballs_enabled` to `true`
3. Visiting any website, e.g. https://www.happy-eyeballs.net/

(Consider enabling DoH to get DNS HTTPS RR on all platforms.)

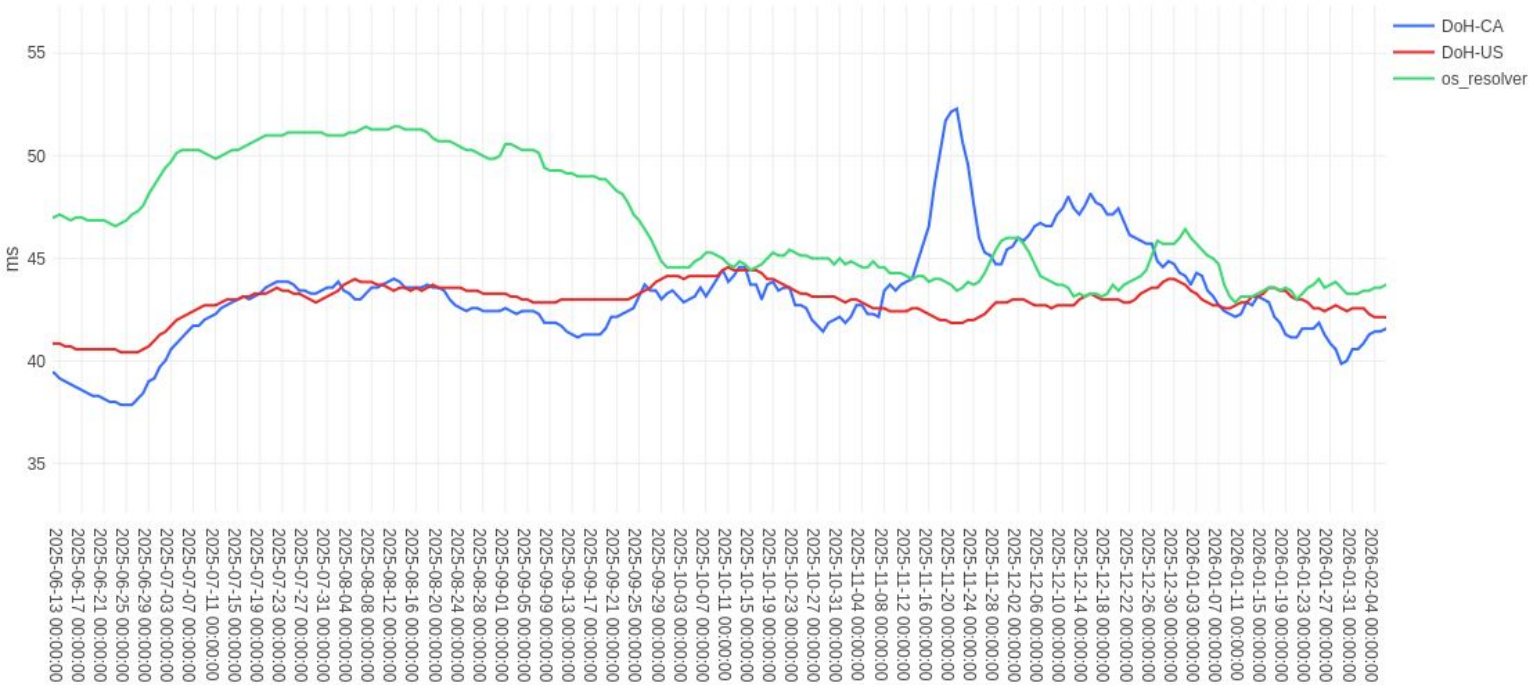
Status

- In Firefox Nightly, disabled by default
- No major deviation from the Draft
- Likely to tune the resolution delay and connection establishment latency based on Firefox ~99th percentile
- Considering adding Proxy awareness
    a. Proxy connection
    b. Proxy protocol
    c. Target connection

Firefox Telemetry

- Public dataset
- Upcoming metrics
  - Resolution delay by record type
  - Number of connection attempts
  - Connection outcome (http version, IP version, ech, …)
  - Suggestions?
- Required to align with Mozilla’s privacy stance

DNS Lookup - 75th percentile



See Firefox telemetry.

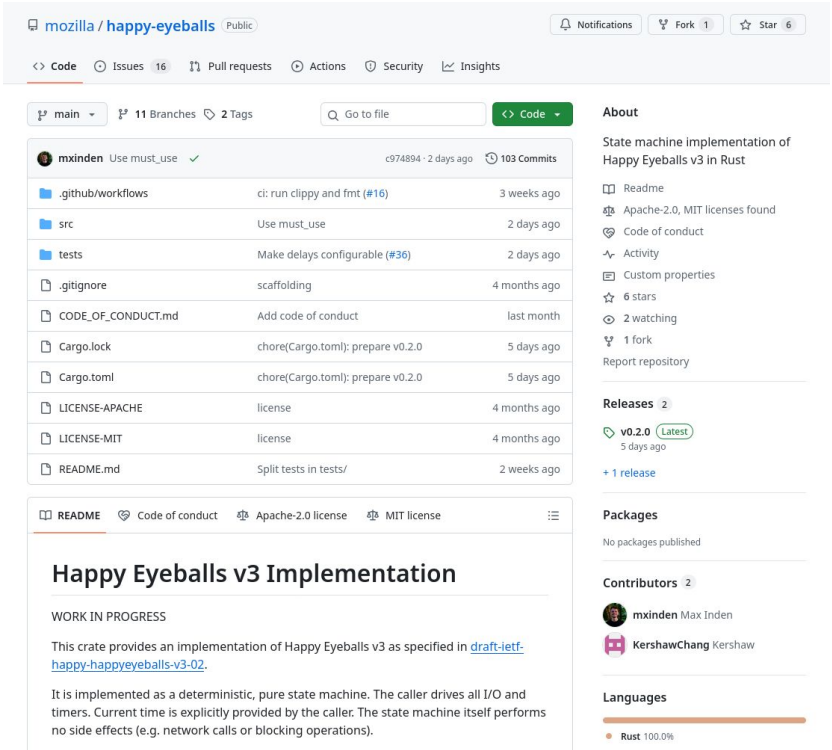
Connection Establishment Latency

5th	11 ms
25th	37 ms
50th	73 ms
75th	123 ms
95th	537 ms
99th	1.7 s
99.9th	11 s

See Firefox telemetry.

Independent Library

- Rust library [mozilla/happy-eyeballs]
- Deterministic, no side-effects, abstract over I/O and time
- No dependencies on Firefox
- Permissive license (MIT and Apache)
- Input, questions and contributions welcome.



Test Suite

- Easy to formalize Happy Eyeballs v3 algorithm
- Helpful for working group?

```rust
#[test]
fn connection_attempt_delay() {
    let (mut now, mut he) = setup();

    // Each tuple is an (input, output) pair:
    //  - input: an event fed *into* the state machine
    //  - output: the next action the state machine asks *us*
    //    to perform
    he.expect(
        vec![
            // State machine asks us to send DNS queries.
            (None, Some(out_send_dns_https(Id::from(0)))),
            (None, Some(out_send_dns_aaaa(Id::from(1)))),
            (None, Some(out_send_dns_a(Id::from(2)))),
            // Feed HTTPS positive response, state machine waits
            // for more.
            (
                Some(in_dns_https_positive_no_alpn(Id::from(0))),
                Some(out_resolution_delay()),
            ),
            // Feed AAAA positive response, state machine attempts
            // a connection.
            (
                Some(in_dns_aaaa_positive(Id::from(1))),
                Some(out_attempt_v6_h1_h2(Id::from(3))),
            ),
            // Feed A positive response, state machine waits for
            // connection attempt delay.
            (
                Some(in_dns_a_positive(Id::from(2))),
                Some(out_connection_attempt_delay()),
            ),
        ],
        now,
    );
```

Next Steps

- Pending work for the Happy Eyeballs v3 Rust library on GitHub
- Pending work for the Firefox integration on Mozilla's Bugzilla
- We plan to:
  - enable Happy Eyeballs v3 on Firefox Nightly in the coming weeks
  - ship it in Firefox Release in the coming months
- We can share more telemetry at IETF 126

Questions? Proposals?

- https://github.com/mozilla/happy-eyeballs/issues/new
- https://bugzilla.mozilla.org/show_bug.cgi?id=1953459
- mail@max-inden.de
- @mxinden everywhere else