

# Internet Connection Quality

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# Our Goal

Our aim is to publish a continuously collected data set of “internet connection quality” as experienced by Firefox clients across the world.

- we would like to provide open data sets to the research community, policy makers and the general public
- transparent methodology for a set of measures around Internet quality
- public-facing report of globally distributed, Firefox user-representative longitudinal data for consumers and researchers (e.g. “network.metrics.mozilla.com” to mirror the hardware report at “hardware.metrics.mozilla.com”)
- provide a source of more reliable Internet quality measures for developers/marketers (e.g. Firefox updates are 3x slower in small towns in India).

# Many definitions of QoE

- As a first definition (and this is not the final one), our measure will be goodput and latency as measured by a download from CDN.
  - The idea being the CDN based good put will be an upper bound
- For this pilot we stuck to one CDN (though good put depends on CDN)

# Many definitions of QoE cont'd

Suggested other definitions

- Measure goodput of actual web page browser usage
  - Needs several man hours of engineering
  - Also need to carefully define what part of the web viewing experience needs to be measured
  - e.g caching,
  - out of order page loading
  - Async pages

We started small and this pilot is used to answer several questions that would be important for all definitions

# Questions answered by Pilot

1. We want to know if CDNs make a difference (and if so is it 'small'). If they don't then we won't need to 'block' for CDN in any future experiment. We have 1:1 split (within Test ) between Akamai and Cloudfront.
2. We collect across 3 different countries in order to find out if there is difference in internet connection quality (ICQ) and how much this is
3. There many factors that contribute to the variability yin measuring data .e.g the network loads, time of day, country, ISP. We would like to know if the network variability that exists in clients session to session usage is a significant contributor to overall variability. If this is not the case we won't need longitudinal measurements on clients

# Questions answered by Pilot

4. We are collecting 4 measurements per client in 3 weeks. Is this enough time? Our guess is that is that is enough time and nobody will be censored(not enough time to measure 4 obs)
5. Is there a large percentage of profiles on networks with high latency? We don't download for such profiles and if this number is high this will affect the representativeness of our data (and the feasibility of this approach)
6. Does a default- opt in download in the background associate with lower usage?
7. Is there a time of day/day of week effect across clients? Does ICQ change with times of day uniformly across countries. That is we can't say there is a fixed quality for group of persons. The quality might improve depending on when they use it (e.g. night time is less overall usage in the locality)

# Experiment Design

- we choose a 0.5% random sample of profiles from US, DE, and India on the latest Firefox and on Windows
- Enrollment is for a week and we monitor subjects for up to 3 weeks.
- 20% of these profiles are in the Control group (no measurement)
- For test, download 4MB blob from CDN on 4 separate occasions
  - (Assuming profile is not on a slow-2g or 2g network)
  - If profile is on slow, profile is unenrolled
  - Had smarter methods to still get data but decided not to for pilot

# Data Collected

- date and time of download
- test/control status
- download size
- download success/aborted/incomplete/fail etc
- goodput at 500ms intervals
- labelled connection type (slow-2g,2g,3g,4g,...) see <https://wicg.github.io/netinfo/#underlying-connection-technology>
- latency
- geo (geo)
- client\_id

# And now

- Data coming in
- Need to validate data (arriving according to spec)

What are next steps? What sort of data would be useful to the community(public/policy makers)