

Measurement @ Google

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My background

- PhD from University of Washington in 2011
Distributed systems & networking
- Google since 2010
 - Infrastructure systems until 2011
 - Since: Mobile web performance




Chrome Browser - Google

Google Inc. - March 17, 2014

Communication

Installed

 This app is compatible with all of your devices.

★★★★☆ (1,314,489)

[App Store](#) > [Utilities](#) > [Google, Inc.](#)



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Chrome - web browser by Google

Google, Inc. >

Details

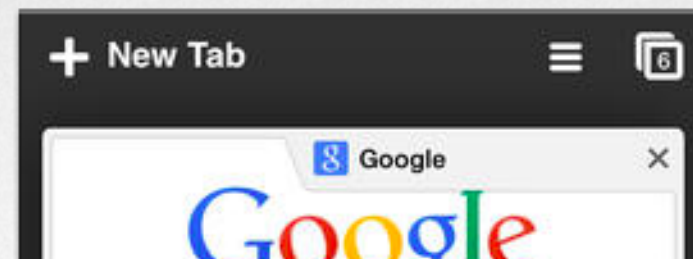
Ratings and Reviews

Related

Screenshots

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Speak r

This talk

- What I work on at Google
- The measurement infrastructure driving it
- Where we need help



My team:
Making the mobile web fast

The web was not designed for mobile

Mismatch between HTTP, TCP, and 3G/4G technologies

Poorly tuned browsers running on slow CPUs with limited memory

Lack of good tools to measure mobile web performance

Badly designed pages that fail to account for limited device capabilities

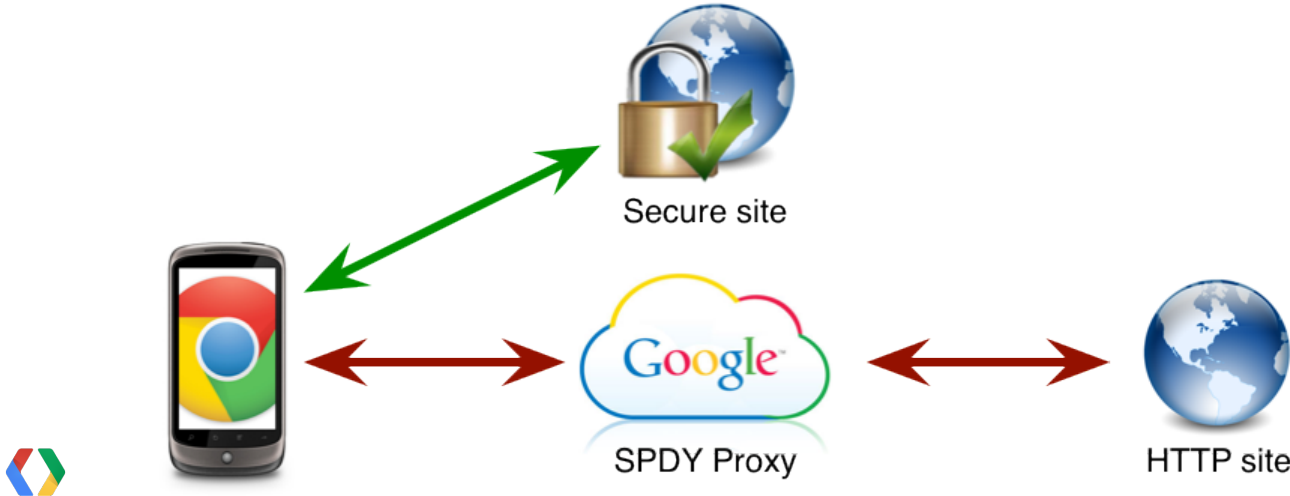
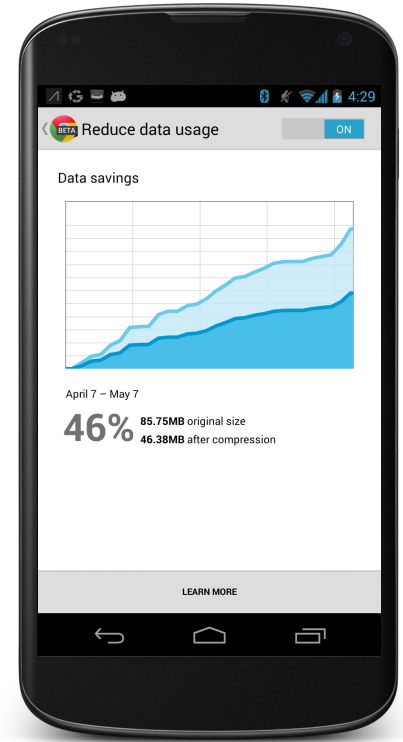


Chrome mobile data compression proxy

Can't wait for fixes to every website, so provide a free proxy service that optimizes sites on-the-fly.

Goal: Optimize page load times, while saving users money

Proxy only HTTP (not HTTPS or Incognito tabs)



Optimizations

Compress images to WebP format

Reduce image resolution and quality

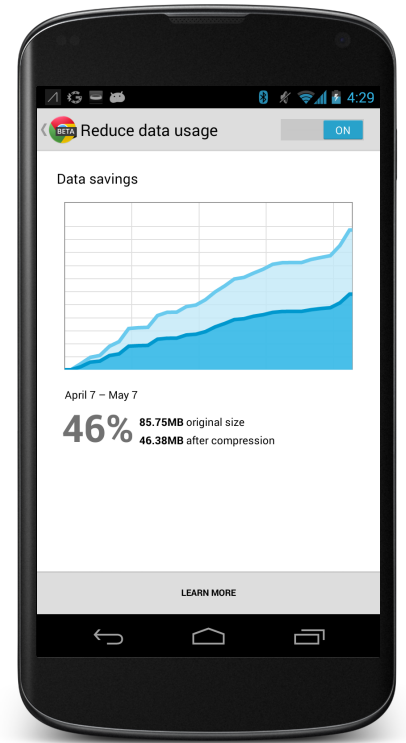
Minify JavaScript and CSS

Gzip everything

Deliver all page content via SPDY
(Baseline for the HTTP/2.0 standard)

Cache web content in Google's datacenters

These techniques result in **50% compression** on average

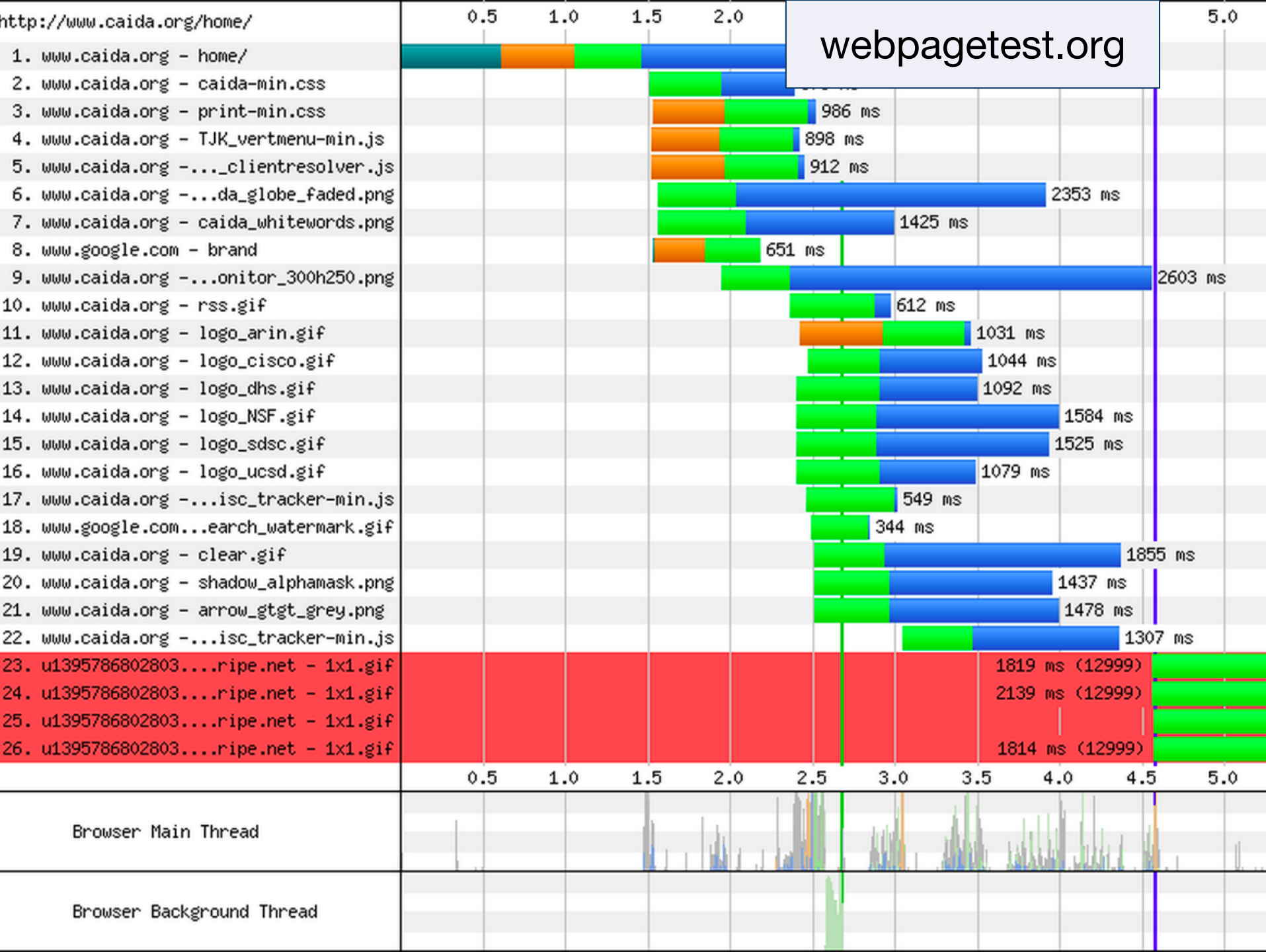


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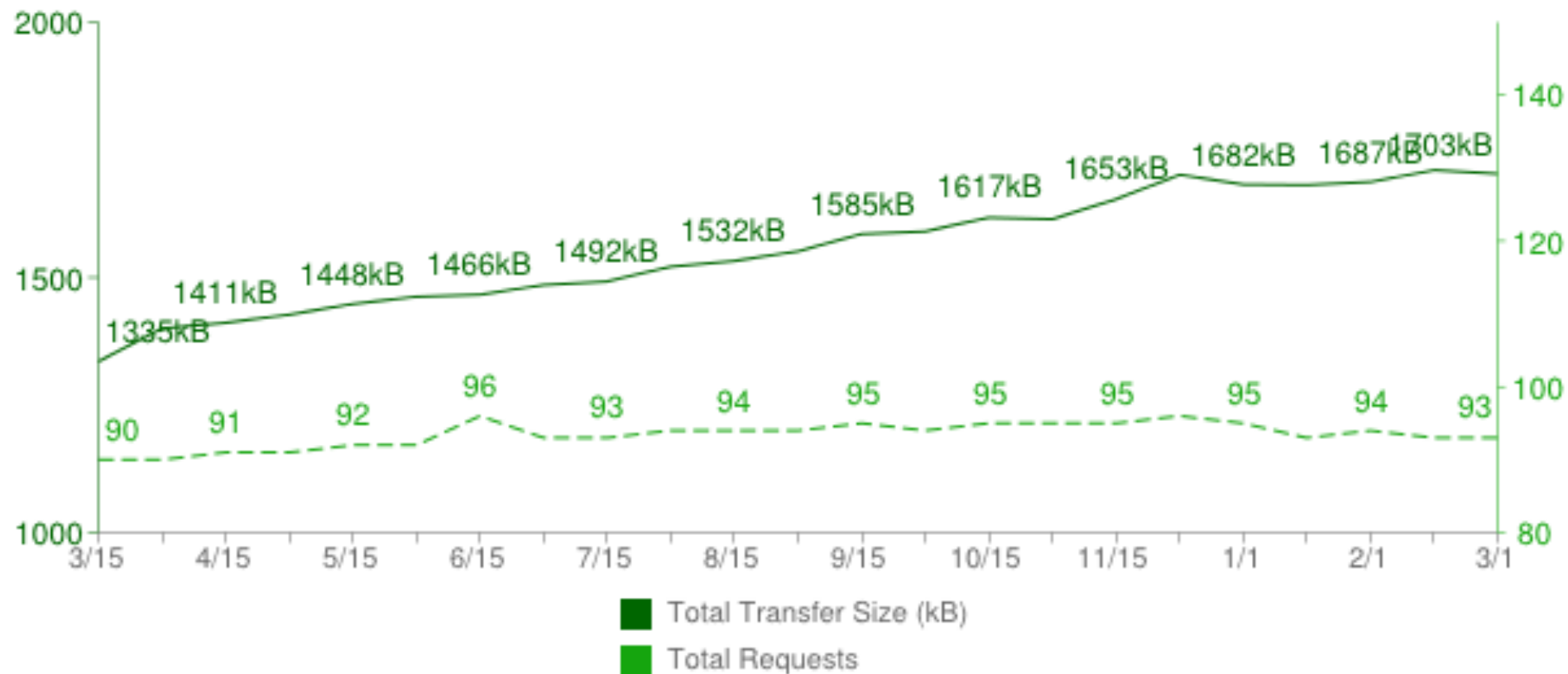
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Aggregate stats from client metrics

- Chrome performance counters – [about:histograms](#)
- Timing information about nearly everything
 - Network failures, performance, cache, page structure, ...*
- Aggregated for users that opt-in. Easy to slice and dice.
 - What's the median TCP connection time in the US on LTE?*



Total Transfer Size & Total Requests



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Where we need help

- Have data, need questions
 - For every prefix: capacity, delay, path, ...
 - Usage stats for every country, network type, OS, ...
 - Ability to change OS, browser, network, servers ...
- Temptations to avoid
 - Treating anything as a black box (network, protocols, OS)
 - Focus on data volume rather than techniques & implications
 - Ignoring applications, energy

Collaborating with Google

- Visiting scientist
- PhD internships
- Google Research Awards
- Email: piatek@google.com