

# Chrome's view on Push

IETF 102, httpbis

Brad Lassey

# Prevalence of Push

- 0.04% of HTTP/2 sessions have a push frame
- The average amount of pushed data in a session is 32kb

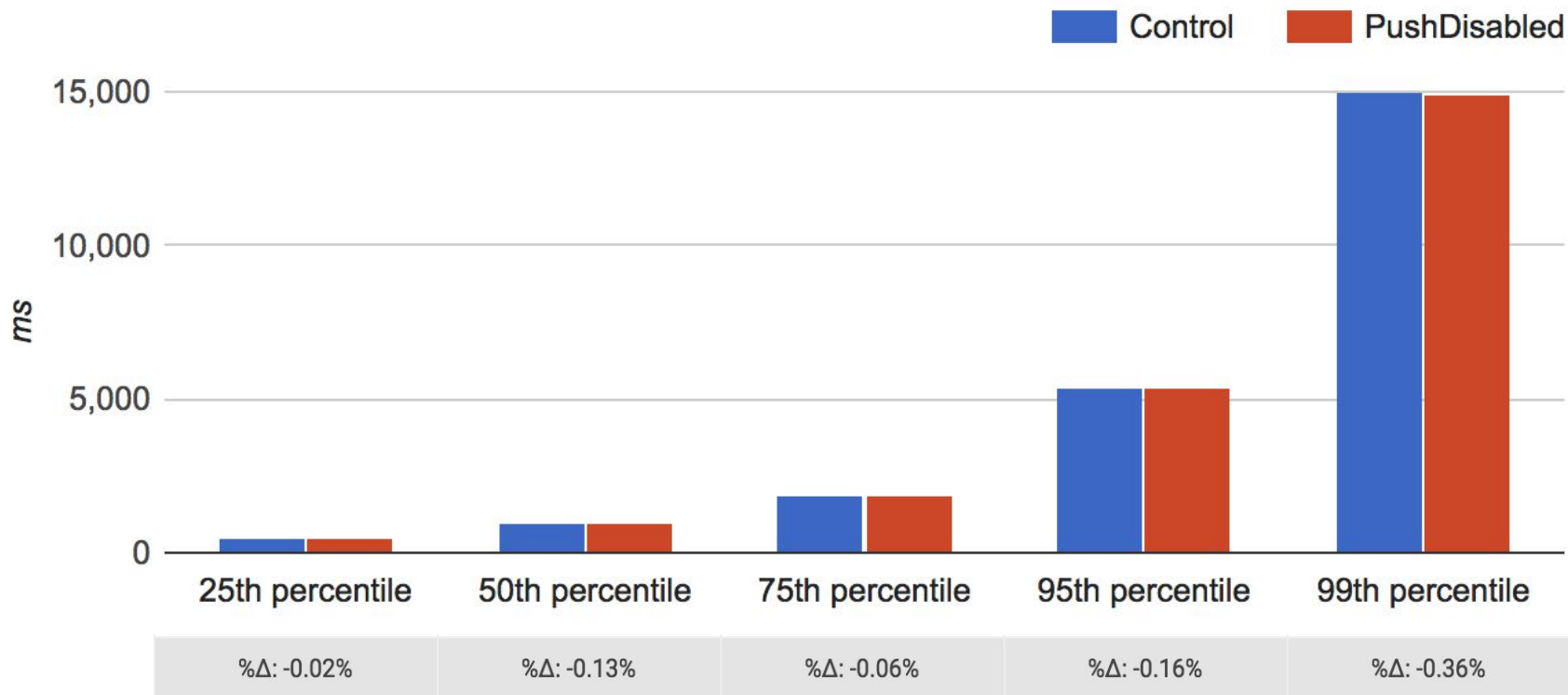
# Push success

- 63.51% of pushed streams are accepted
- 22.35% time out
- 13.39% are duplicate URLs
- The remaining 0.75% fail for various other reasons

# A/B/C experiment

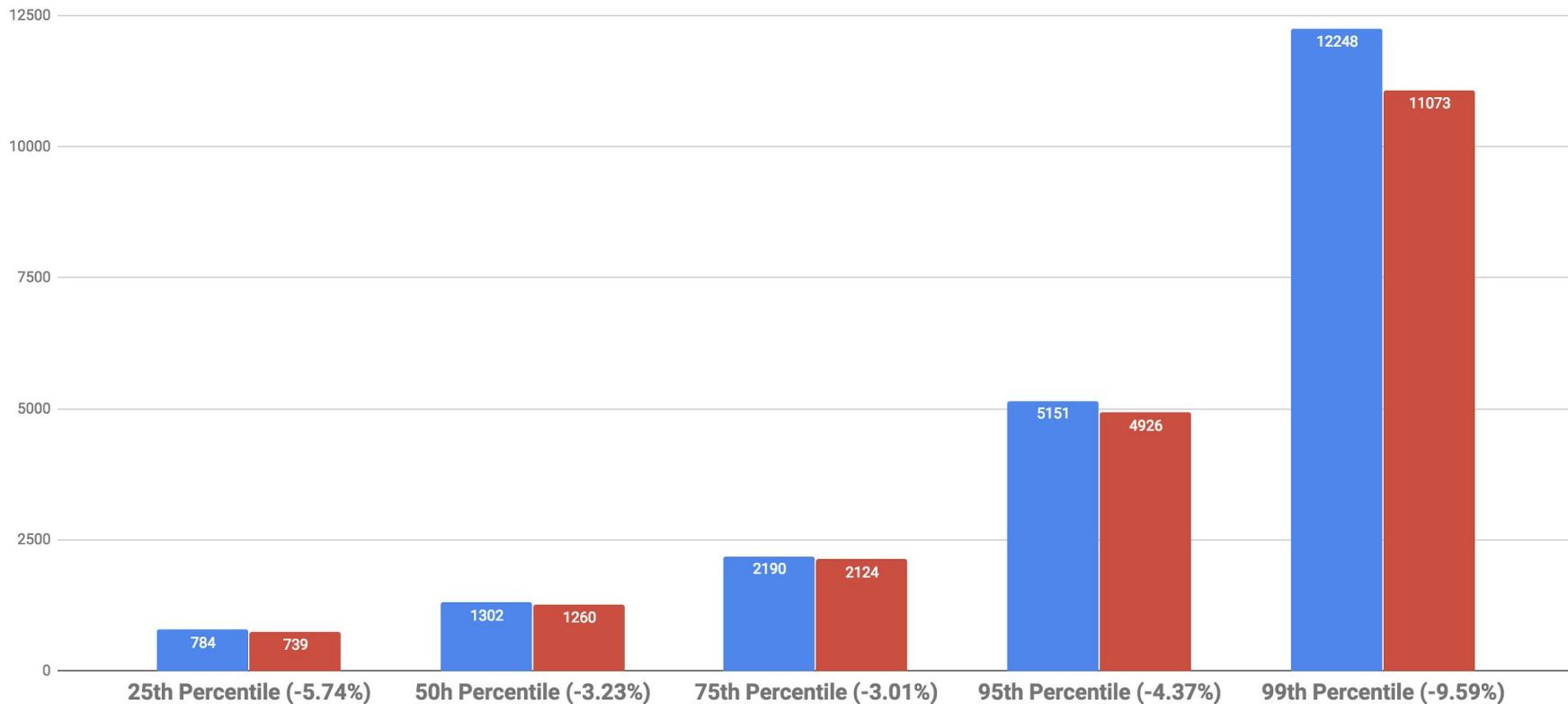
- Experiment in dev, canary and beta
- Disables Push
  - sends a `SETTINGS_ENABLE_PUSH` but still processes Push Frames
- Compares to two control groups
  - No changes
  - Unrelated settings change (`SETTINGS_MAX_CONCURRENT_STREAMS`) in dev and canary
- Dev/Canary data was too noisy to be useful

# A/B Experiment results (Beta)



# A/B Experiment, Filtered by Domains that Push<sup>1</sup>

Control PushDisabled



<sup>1</sup>From http archive: <https://bigquery.cloud.google.com/savedquery/1058239268713:ec65e4a42dbd486fb091718584d73efd>

# Maximum usefulness of Push

$$S_{mp} = \min(BW_i \times RTT, IW) - S_{mr}$$

$S_{mp}$  = Maximum size of pushed resources

$BW_i$  = Initial throughput

RTT = Round Trip Time

$S_{mr}$  = Size of main resource

IW = Initial connection window

# Some Examples

| Country     | Mean Min RTT (ms) <sup>1</sup> | Mean Connection Speed (Mb/s) <sup>2</sup> | Max 1RT Data (kb) |
|-------------|--------------------------------|---|-------------------|
| South Korea | 38                             | 28.6                                      | 135.85            |
| US          | 50                             | 18.7                                      | 116.87            |
| India       | 188                            | 4.9                                       | 115.15            |

- Despite different network conditions, max 1RT data is similar
- But.... Initial CWND caps this
- IW10([rfc6928](https://tools.ietf.org/html/rfc6928)) equates to ~14600 bytes
  - Need ~IW100 for RTT and speed to factor in (Hi Fastly<sup>3</sup> folks!)

<sup>1</sup> The QUIC Transport Protocol: Design and Internet-Scale Deployment <https://static.googleusercontent.com/media/research.google.com/en//pubs/archive/46403.pdf>

<sup>2</sup> akamai's [state of the internet] Q1 2017 report <https://www.akamai.com/us/en/multimedia/documents/state-of-the-internet/q1-2017-state-of-the-internet-connectivity-report.pdf>

<sup>3</sup> Demystifying TCP Initial Window Configurations of Content Distribution Networks [http://tma.ifip.org/2018/wp-content/uploads/sites/3/2018/06/tma2018\\_paper13.pdf](http://tma.ifip.org/2018/wp-content/uploads/sites/3/2018/06/tma2018_paper13.pdf)



# If we destroyed push, would anyone really notice?

Currently only 0.04% of sessions

Seems to be a footgun

Better things to work on:

- Connection Pooling
- Prioritization
- DoH
- QUIC
- Alt svc
- ????

