Chrome’s view on Push

IETF 102, httpbis

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Prevalence of Push

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

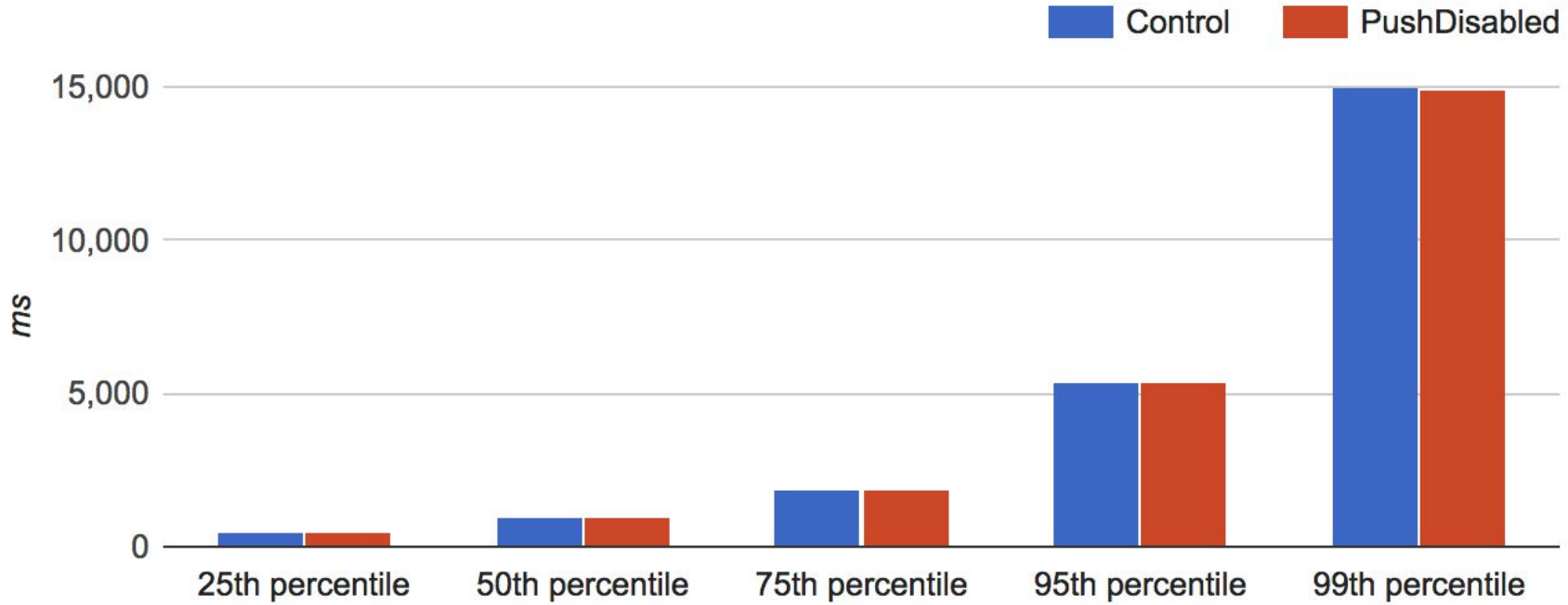
Push success

- 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

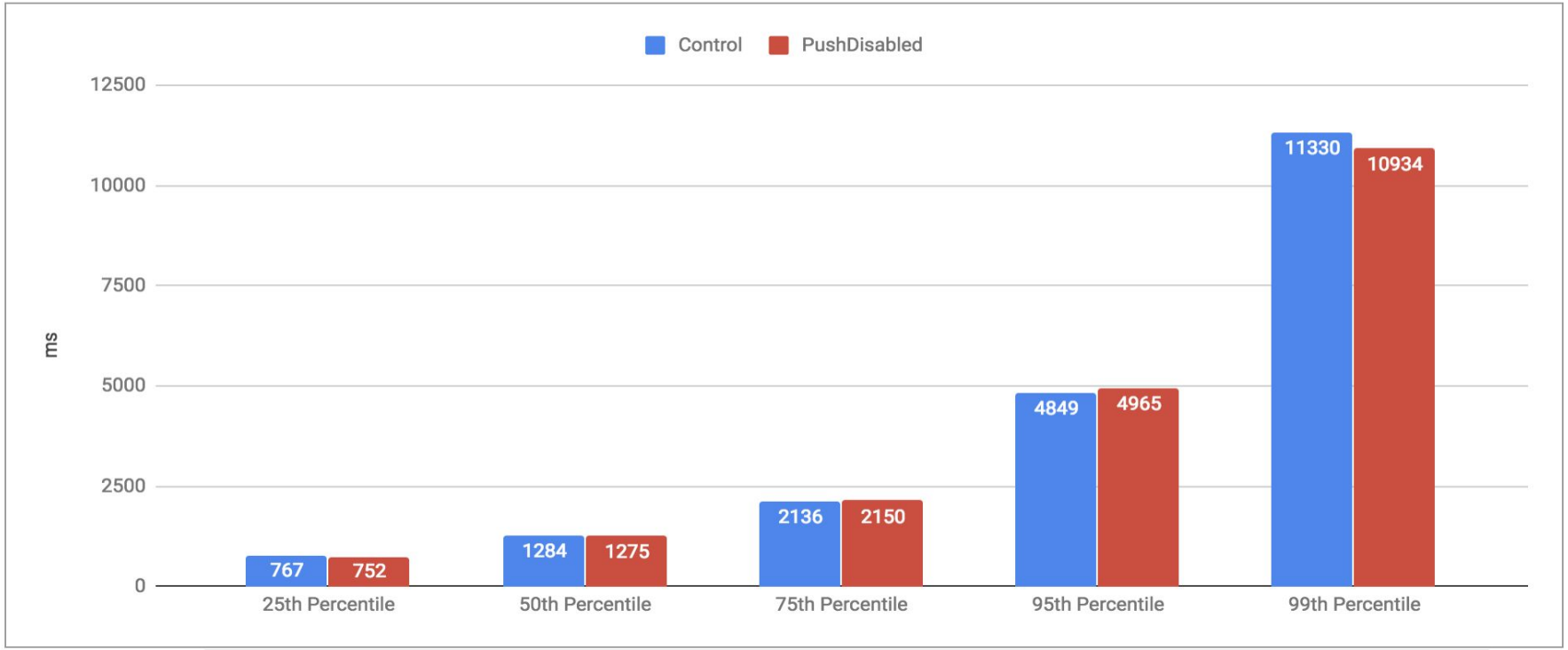
- Experiment in dev, canary and beta
- Disables Push
  - sends a SETTINGS_ENABLE_PUSH but still processes Push Frames
- Compares to two control groups
  - No changes
  - Unrelated settings change (SETTINGS_MAX_CONCURRENT_STREAMS) in dev and canary
- Dev/Canary data was too noisy to be useful

A/B Experiment results (Beta)



%Δ: -0.02%	%Δ: -0.13%	%Δ: -0.06%	%Δ: -0.16%	%Δ: -0.36%

A/B Experiment, Filtered by Domains that Push[1]



[1]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)[1]	Mean Connection Speed (Mb/s)[2]	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) equates to ~14600 bytes
  - Need ~IW100 for RTT and speed to factor in (Hi Fastly[3] folks!)

[1] The QUIC Transport Protocol: Design and Internet-Scale Deployment https://static.googleusercontent.com/media/research.google.com/en//pubs/archive/46403.pdf
[2] 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
[3] Demystifying TCP Initial Window Configurations of Content Distribution Networks 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
- ????