

# **Responsiveness under Working Conditions**

**draft-ietf-ippm-responsiveness-00**

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Implementation report: Will Hawkins**

# Outline

- Implementation experience - Server-side (*Randall Meyer - Apple*)
- Implementation experience - Client-side (*Will Hawkins - University of Cincinnati*)
- Update to IETF-draft

# Server Implementations

- Access:
  - URL: <https://github.com/network-quality/server>
  - License: MIT
- 2 complete reference server implementations in Go and Swift
- Configurations for Apache Traffic Server, Apache httpd and nginx

# Responsiveness in Go

## A Report On Implementing Responsiveness RFC in Go

- Access:
  - URL: <https://github.com/network-quality/goresponsiveness>
  - License: GPLv3
  - Requirements: Go v. 1.16 (*may* work with earlier versions, but untested)
- Interoperability:
  - Success: Apple's Responsiveness RFC implementation in Go.
  - Success: Apple's public measurement endpoints.
  - TODO: Calibration of RPM between **networkQuality** and Go Responsiveness.

# Responsiveness in Go

## A Report On Implementing Responsiveness RFC in Go

- Lessons:
  - Ensure Go's HTTP API opens HTTP/2 connections.
  - Handle Go's HTTP API's aggressive pooling of TCP connections.
  - Build in debugging support.
  - Take advantage of implementation experience to clarify ambiguities in the protocol.

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Major changes:

- Clarify meaning of “working conditions”
- New Section “*Interpreting responsiveness results*”
- Minor tweaks & wording

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## Clarify meaning of “working conditions”

- **Goal**

*“... realistic traffic pattern ... exploring the worst-case scenario ...”*

- **Realistic**

- Using HTTP/2(3) with standard congestion controls

- **Worst-case scenario**

- Creating multiple bulk HTTP Requests

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## Interpreting responsiveness results

Influencing factors





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## Interpreting responsiveness results

Influencing factors



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## Interpreting responsiveness results

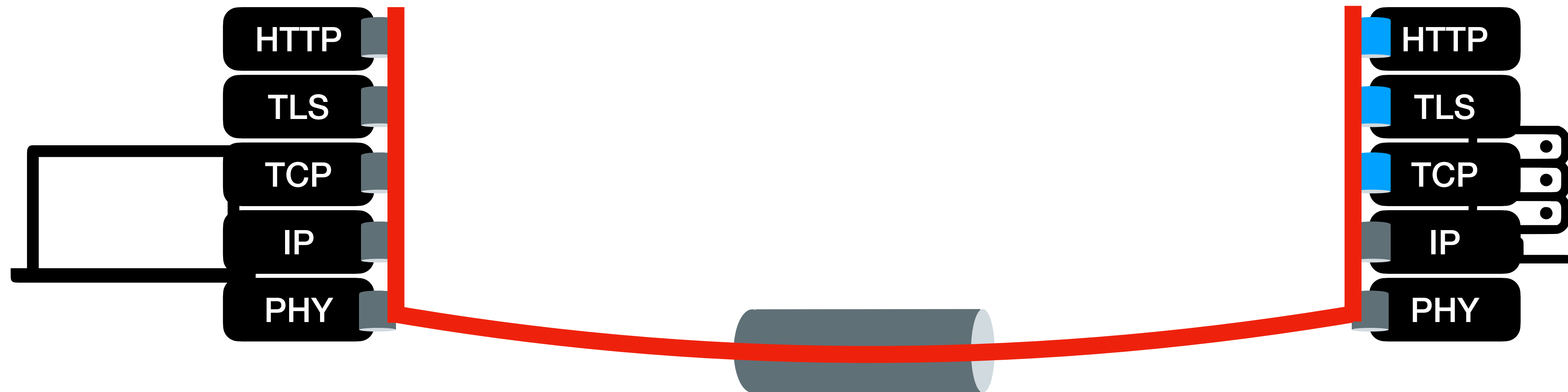
Influencing factors



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## Interpreting responsiveness results

### Root-causing Responsiveness



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## Interpreting responsiveness results

### Root-causing Responsiveness

