Anycast Monitoring with passive TCP RTT (abstract)

Giovane C. M. Moura (1) John Heidemann (2) Jeroen Bulten (3) Wes Hardaker (2) Joao Ceron (1) Cristian Hesselman (1,4) Maarten Wullink (1) Marc Groeneweg (3) Marco Davids (1)

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1: SIDN Labs 2: USC/ISI 3: SIDN 4: University of Twente

Introduction

- Authoritative DNS operators strive to reduce latency
- They often deploy IP anycast on donzes of global sites
    - so they can be closer to clients
- Still, operators *don't* really know what latency most of their clients experience

Measuring your client's latency nowadays

Active methods

- Ripe Atlas [4, 5]
- ThousandEyes [8]
- Verfploeter [1]

They have pros and cons

- Either few VPs, or require some extra effort

Passive methods

- **DNS TCP RTT** - this presentation
- Measure latency for *real clients*
- Works with IPv6, and it's *easy*
- It' s being used in production at SIDN (`.nl` ccTLD)
  - Tech report available [3]: `https://www.isi.edu/%7ejohnh/PAPERS/Moura20a.pdf`

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DNS over TCP? Really?

- Passive TCP latency has been used since 1996 [2]
- Used in CDNs [6]
- But nobody thought of using it for DNS
- Why?
  - DNS over TCP is often overlooked
  - It shoundn't

DNS over TCP? Really?

See tech report for details [3]. But in short:

- 2.6–6% of `.nl` traffic is over TCP
- 20+% of resolvers *eventually* send TCP queries
  - but they are responsible for 30–57% of **ALL** queries
- 44% of ASes covered
- and it's *free* – passive.

Architecture used at SIDN

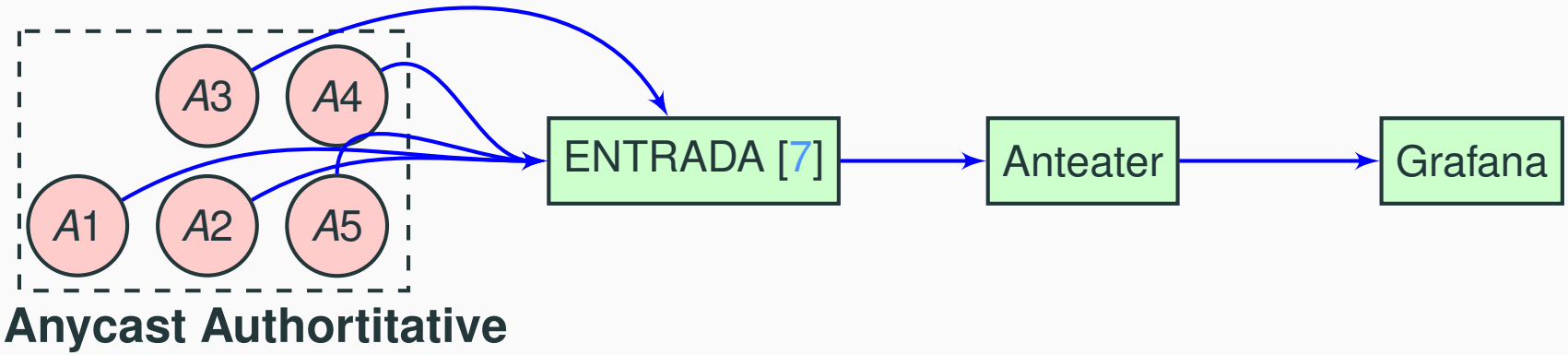
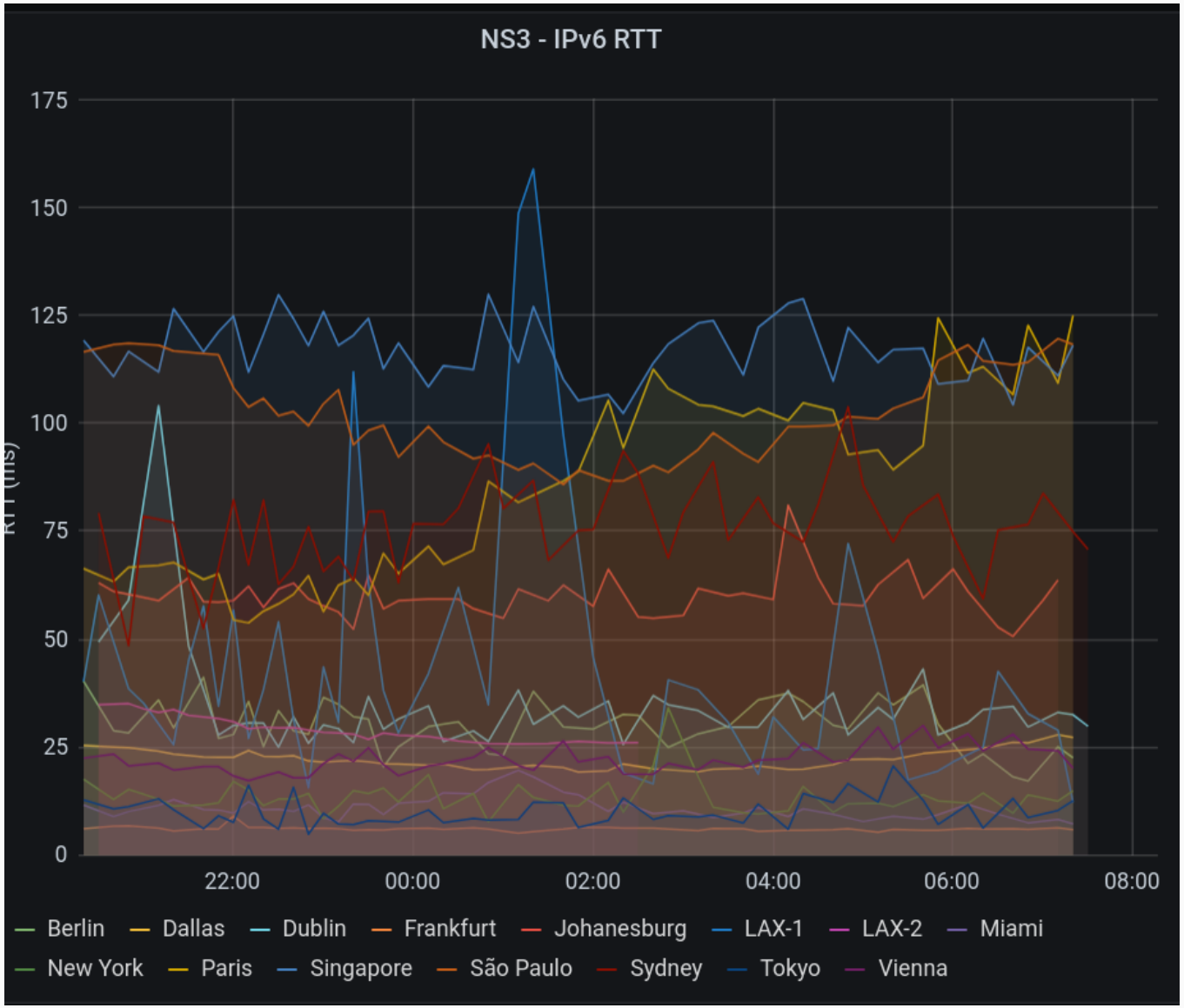


Figure 1: DNS TCP RTT Monitoring Architecture

What can we do with that?

1. Real time monitoring
2. Evaluate your most important client ASes
3. Evaluate individual anycast sites
4. Detect near-real time BGP misconfiguration

Real time monitoring



Prioritization by Client AS

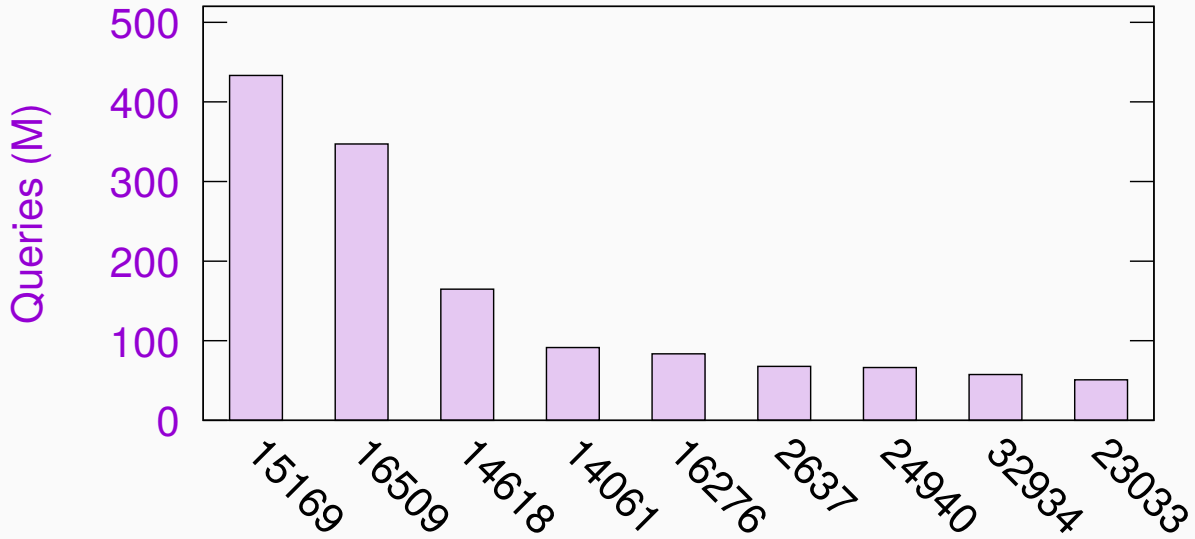


Figure 2: NS1 IPv4

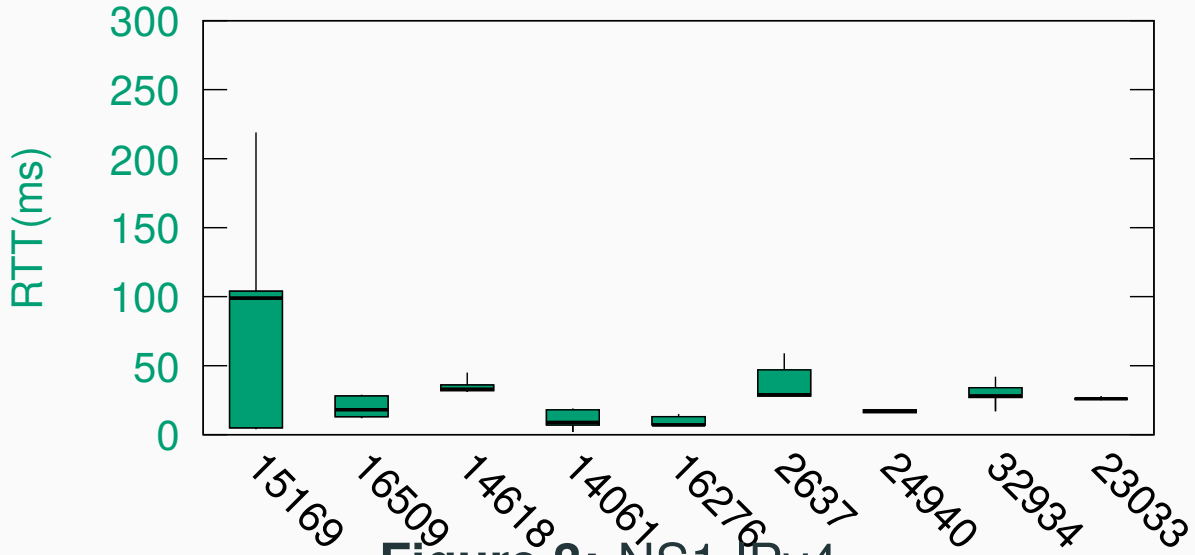


Figure 3: NS1 IPv4

Fixing latency for Google

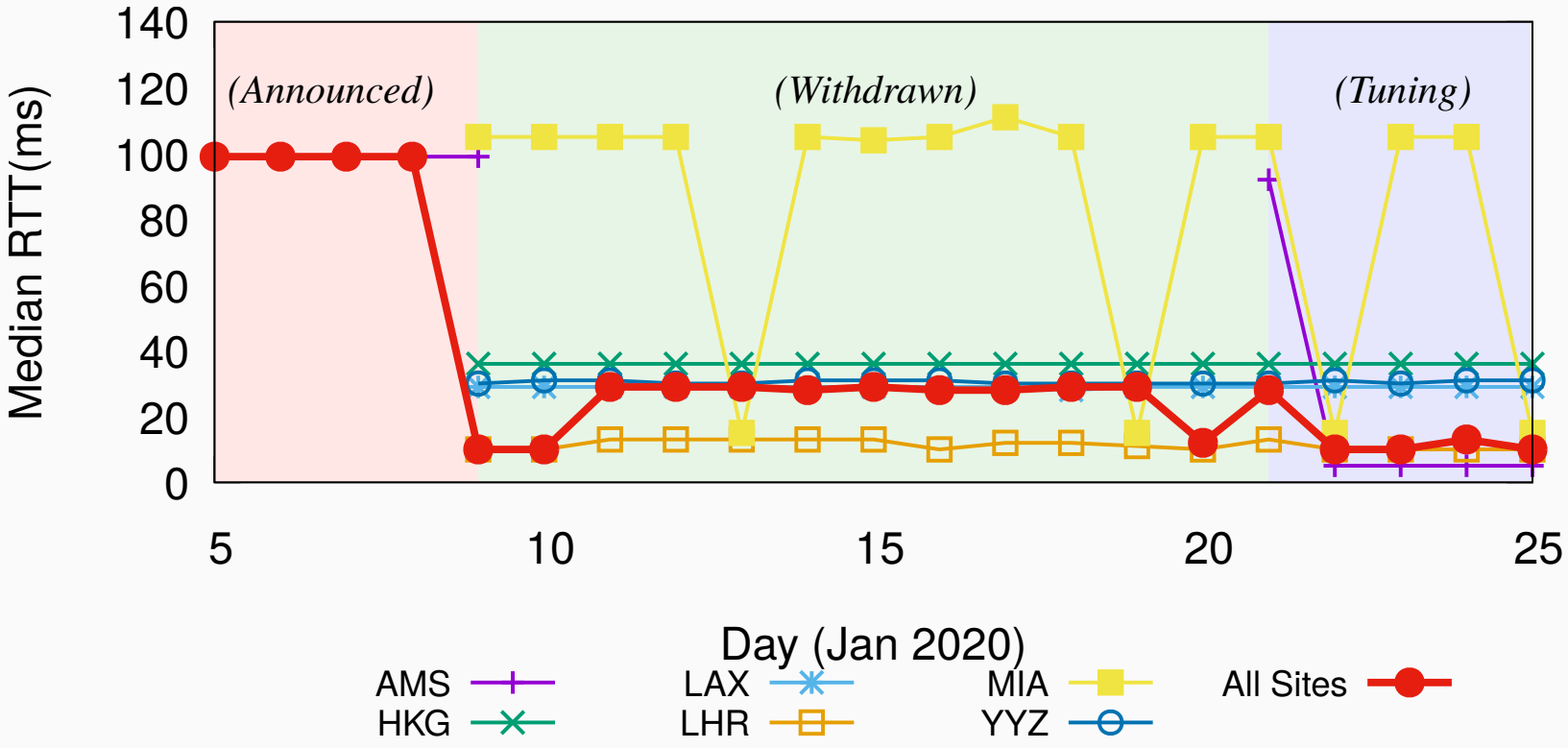


Figure 4: Google: AS15169 - IPv4 - RTT (ms)

Anycast Site analysis

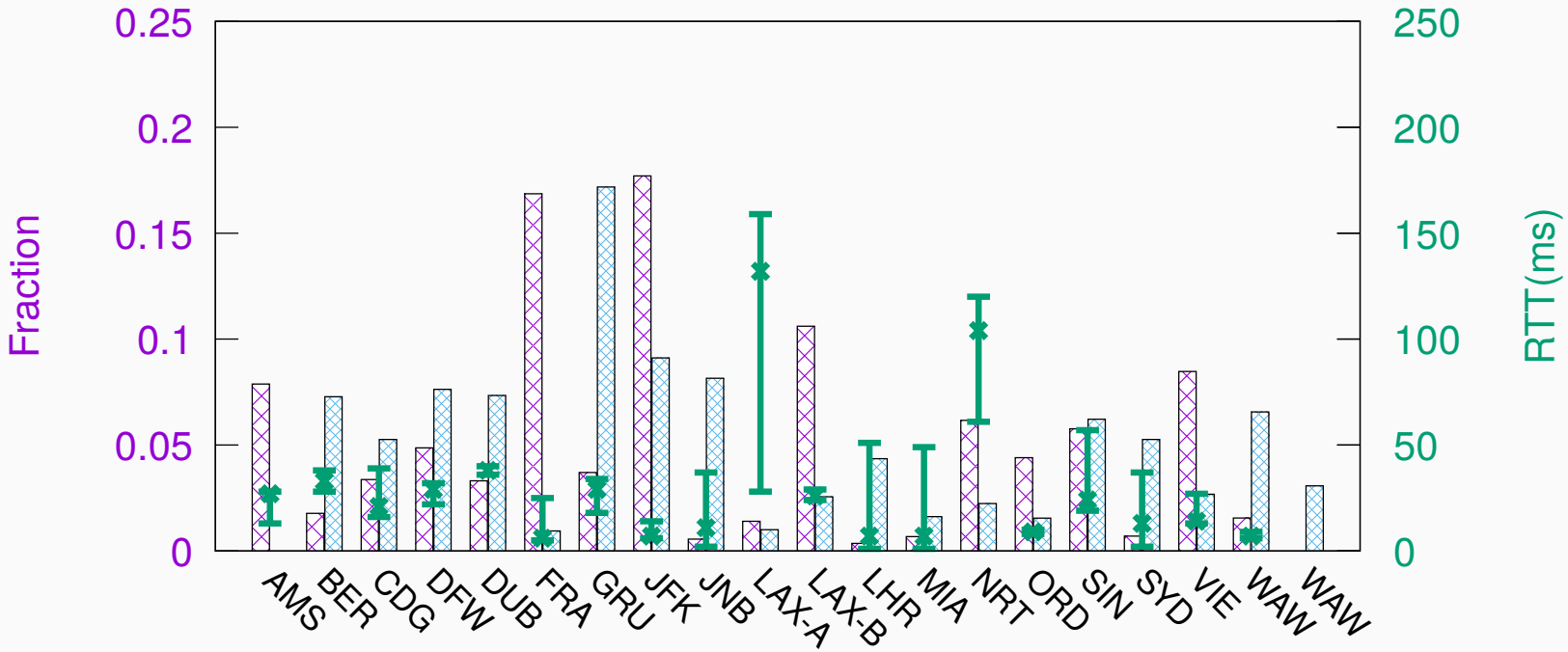


Figure 5: NS3 IPv4

- See NRT (Tokyo, Narita)? High inter-quartile values . But why?

Anycast Site analysis

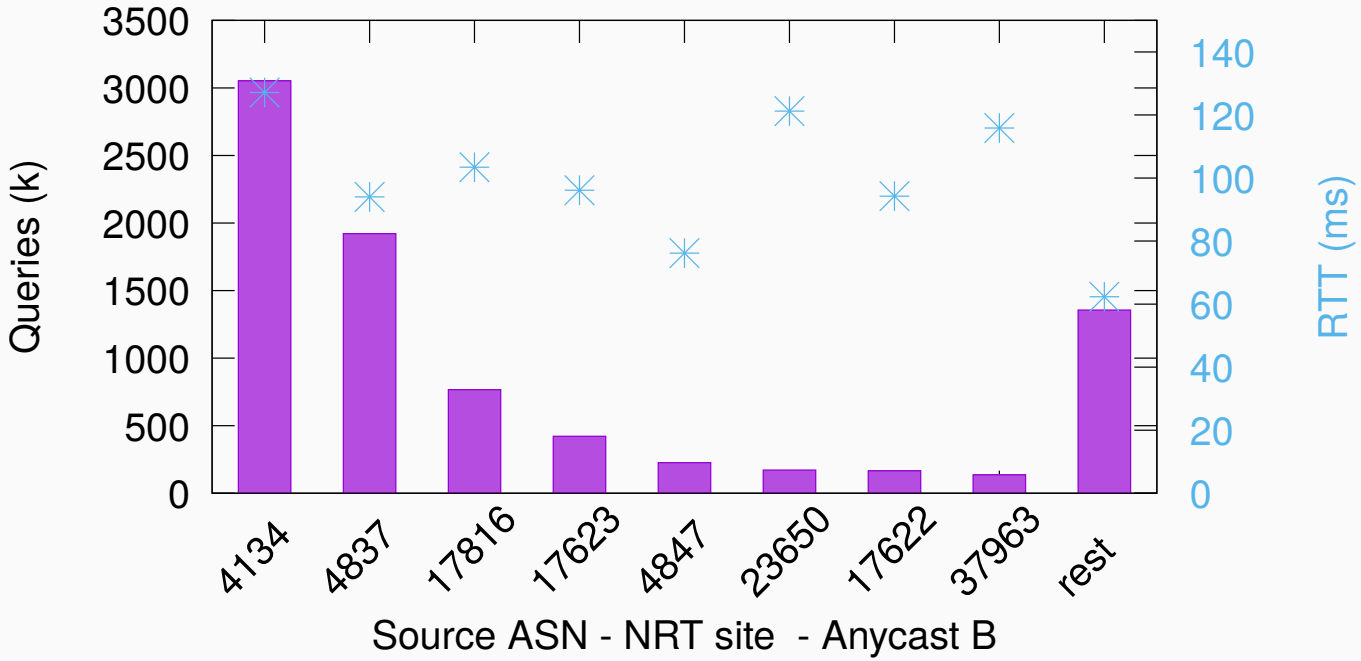


Figure 6: NS3 IPv4

- NRT clients: top 10 from China
- And China has poor Intl' peering [9]

Detecting Near real-time BGP misconfiguration

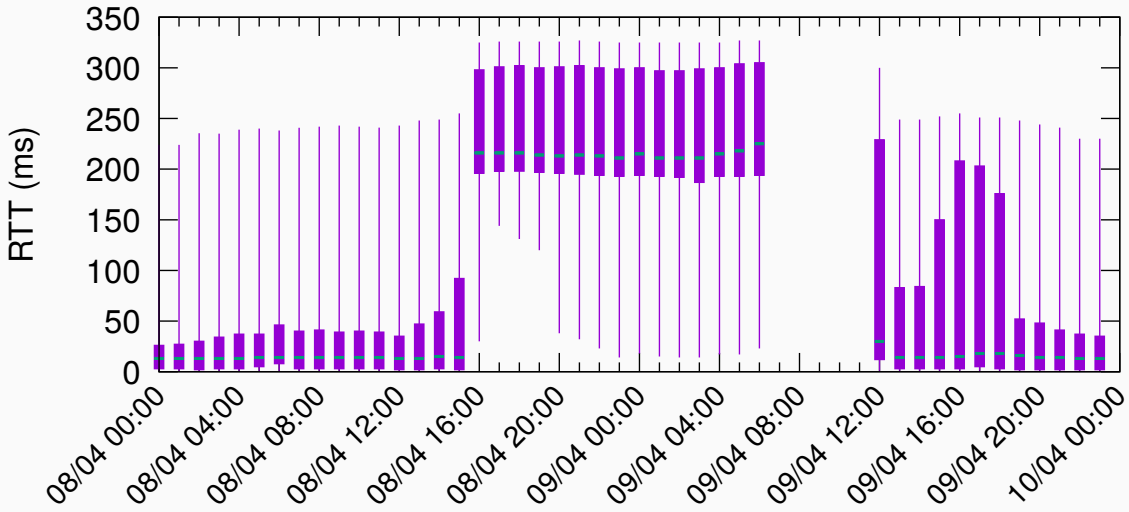
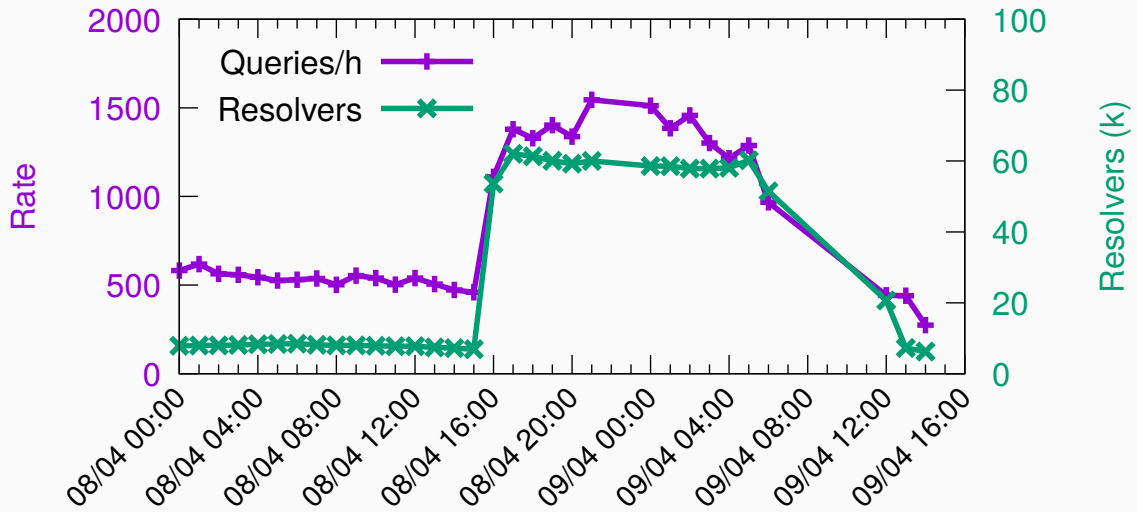


Figure 7: Anycast B SYD site: Latency for IPv4.



Summary

- TCP RTT is old but *gold*
- We use it on `.nl`
- Provides insight into real clients
- Which can be used to fix real problems
- ENTRADA does the math for you – open-source

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