SAND Project

Self-managing Anycast Networks for the DNS

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SDN LABS

NLnet Labs

SAND Project

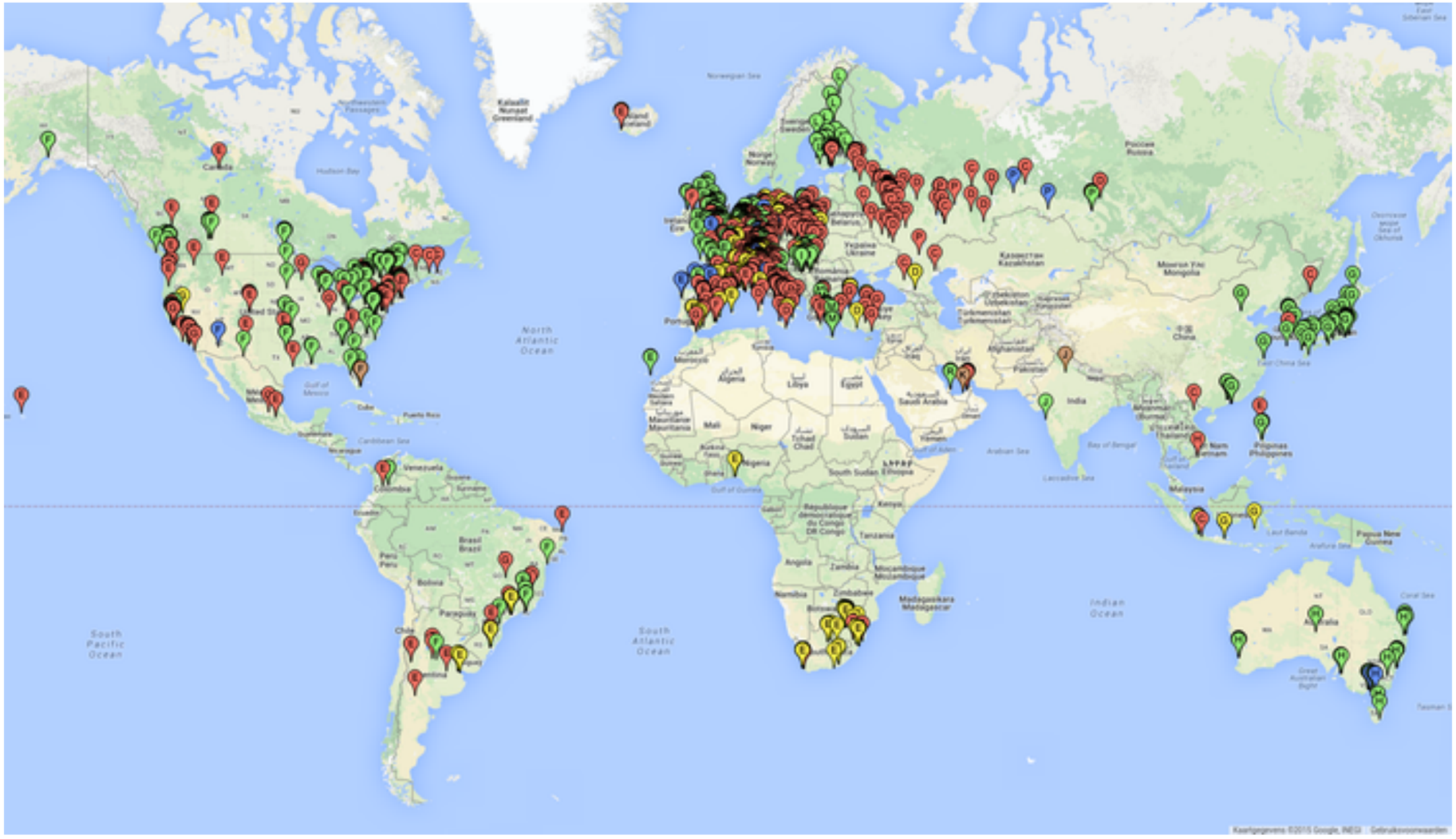
- Bring autonomous management to anycast DNS
  - **M**onitoring: system health, reachability, performance, resilience...
  - **A**nalysis: is everything as expected?
  - **P**lanning: reconfiguration decisions
  - **E**xecution: reconfiguration enforcement
  - **K**nowledge: data gathered or produced

Research Focus

- Most of our research efforts are focused on
  - Monitoring the anycast infrastructure
  - How to use available tools and platforms
  - how to profit from upcoming technologies

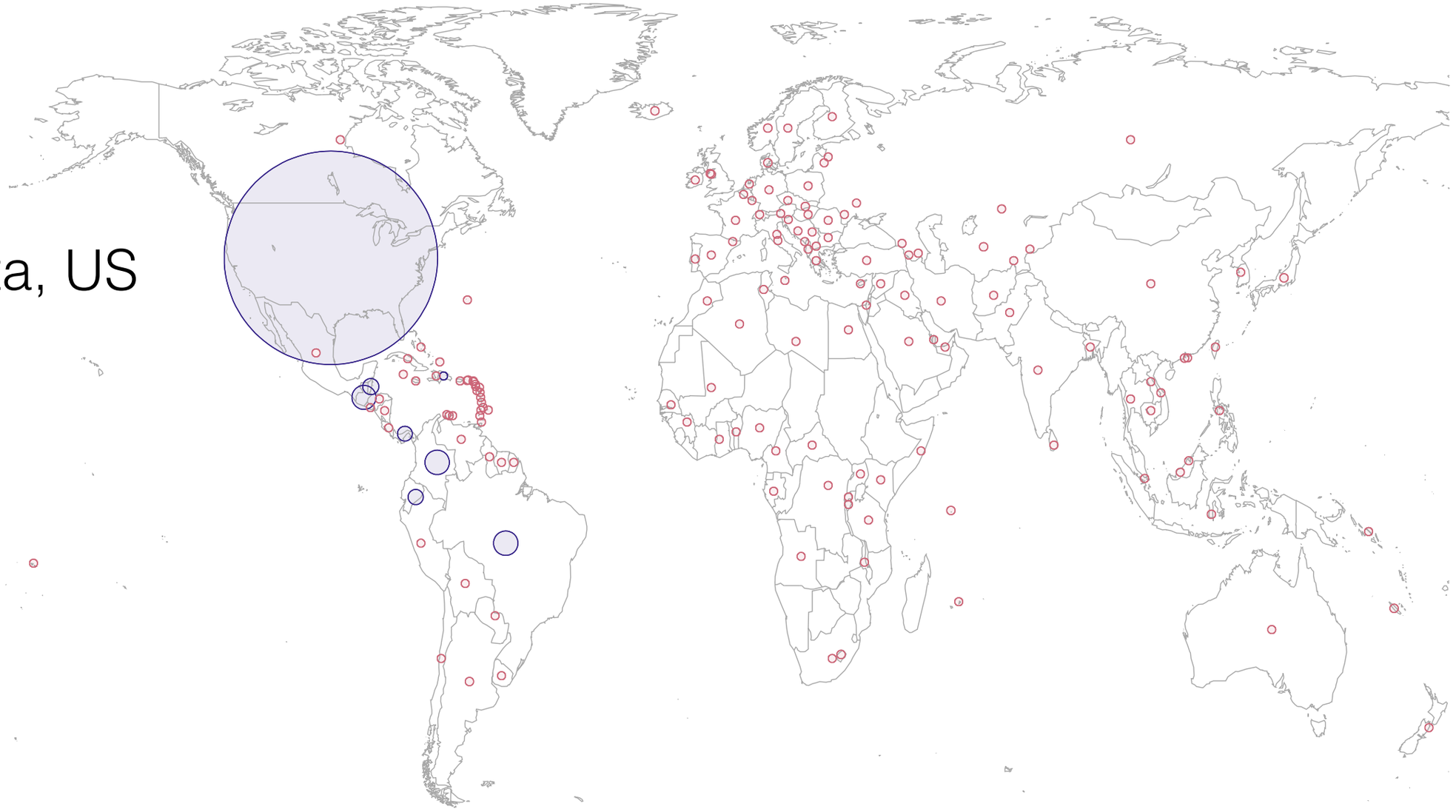
- Examples
  - Using worldwide vantage points (RIPE Atlas) to assess reachability and performance of the anycast DNS
  - Use the anycast infrastructure itself for probing
  - Use ECS information for end user mapping

Monitoring Reachability



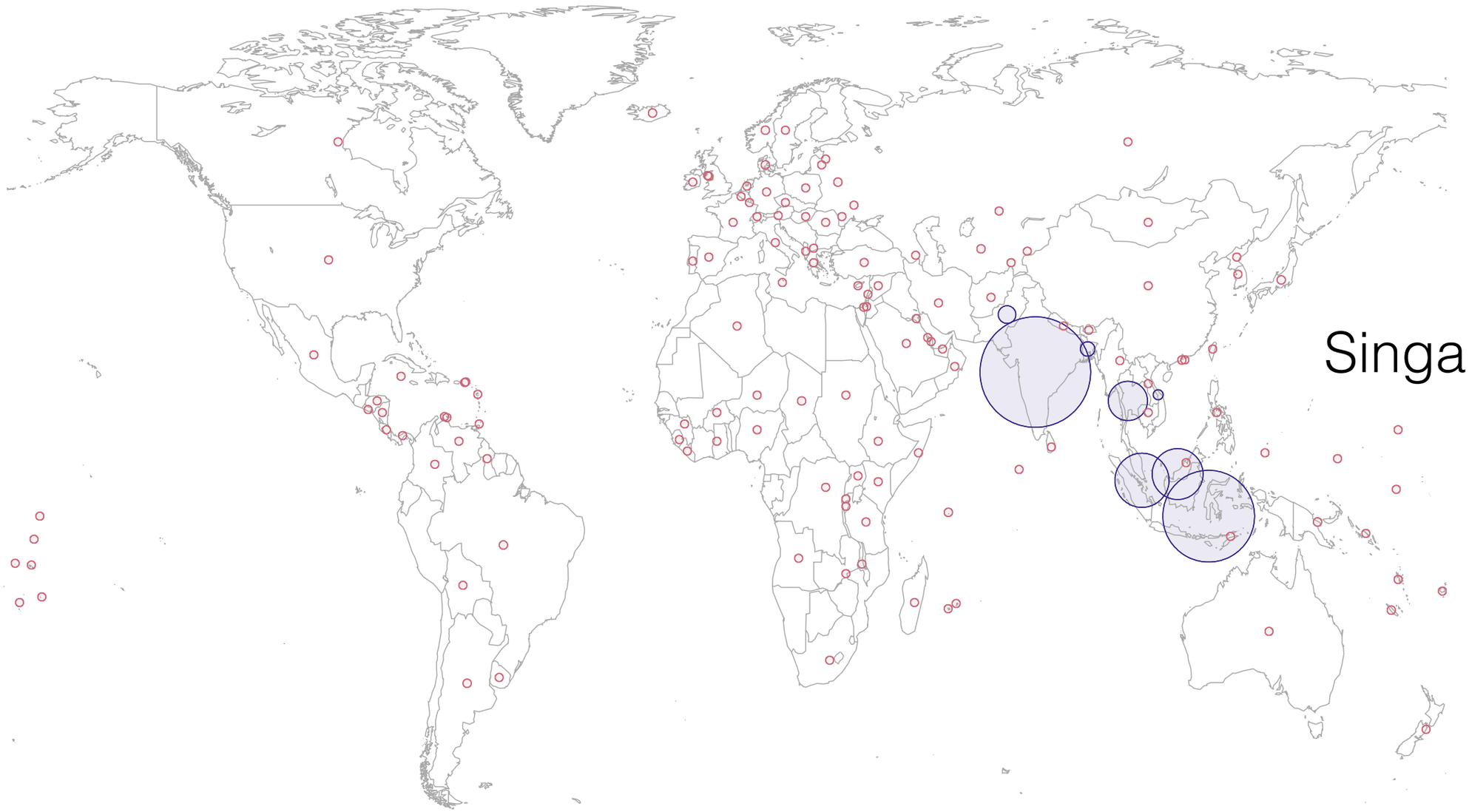
Monitoring Reachability

What is the origin of queries I see?



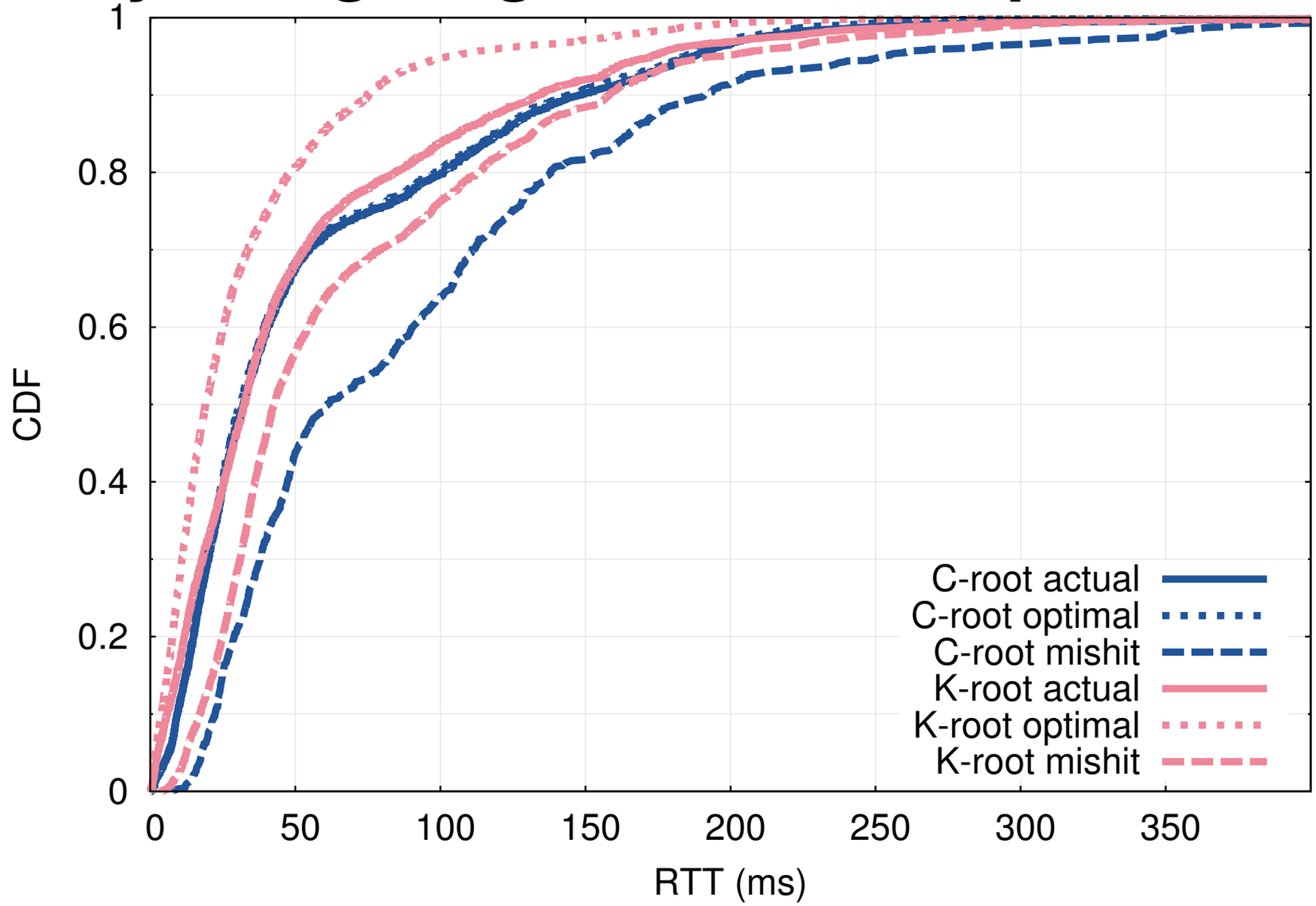
Monitoring Reachability

What is the origin of queries I see?



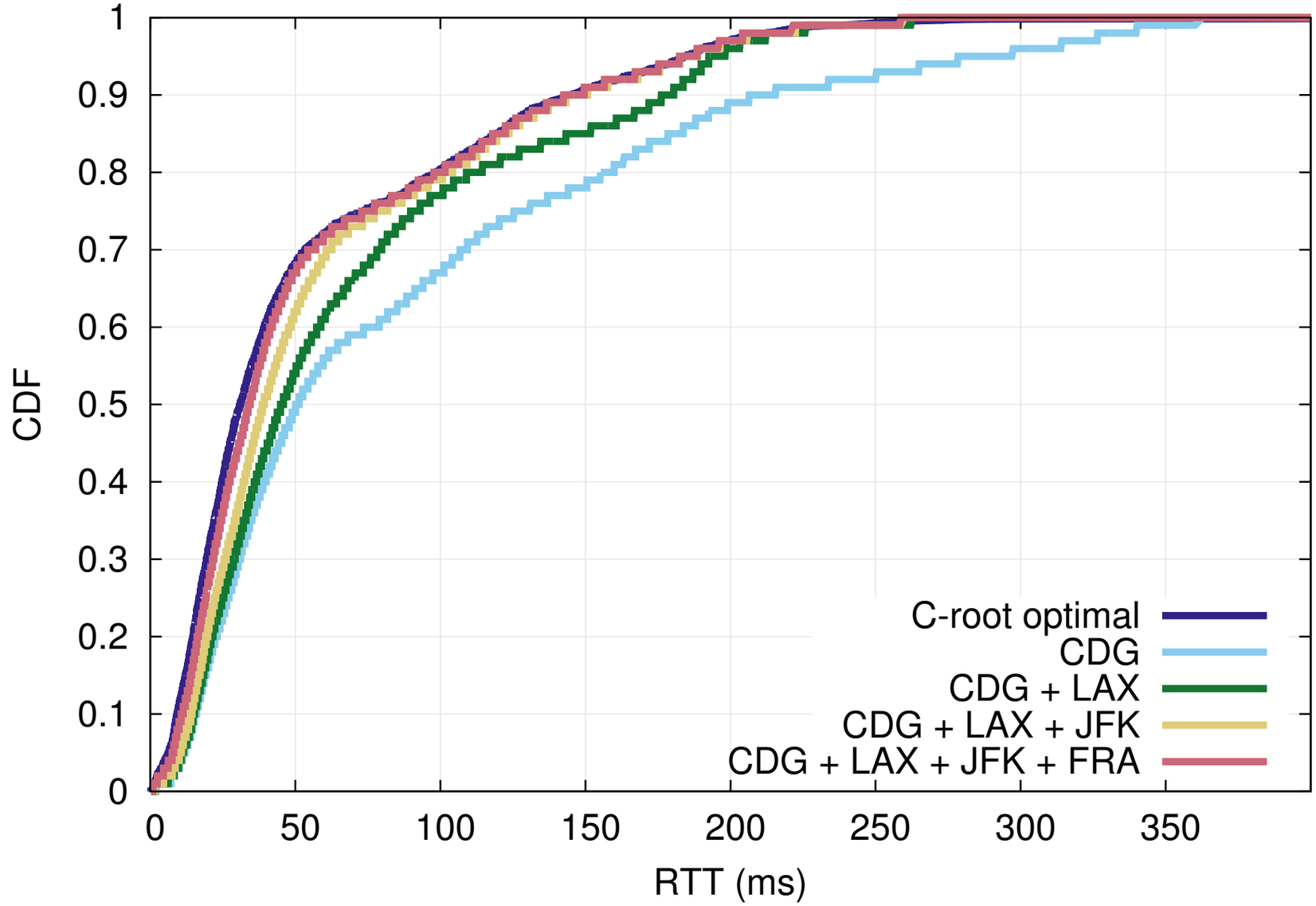
Monitoring Performance

Does anycast give good absolute performance?

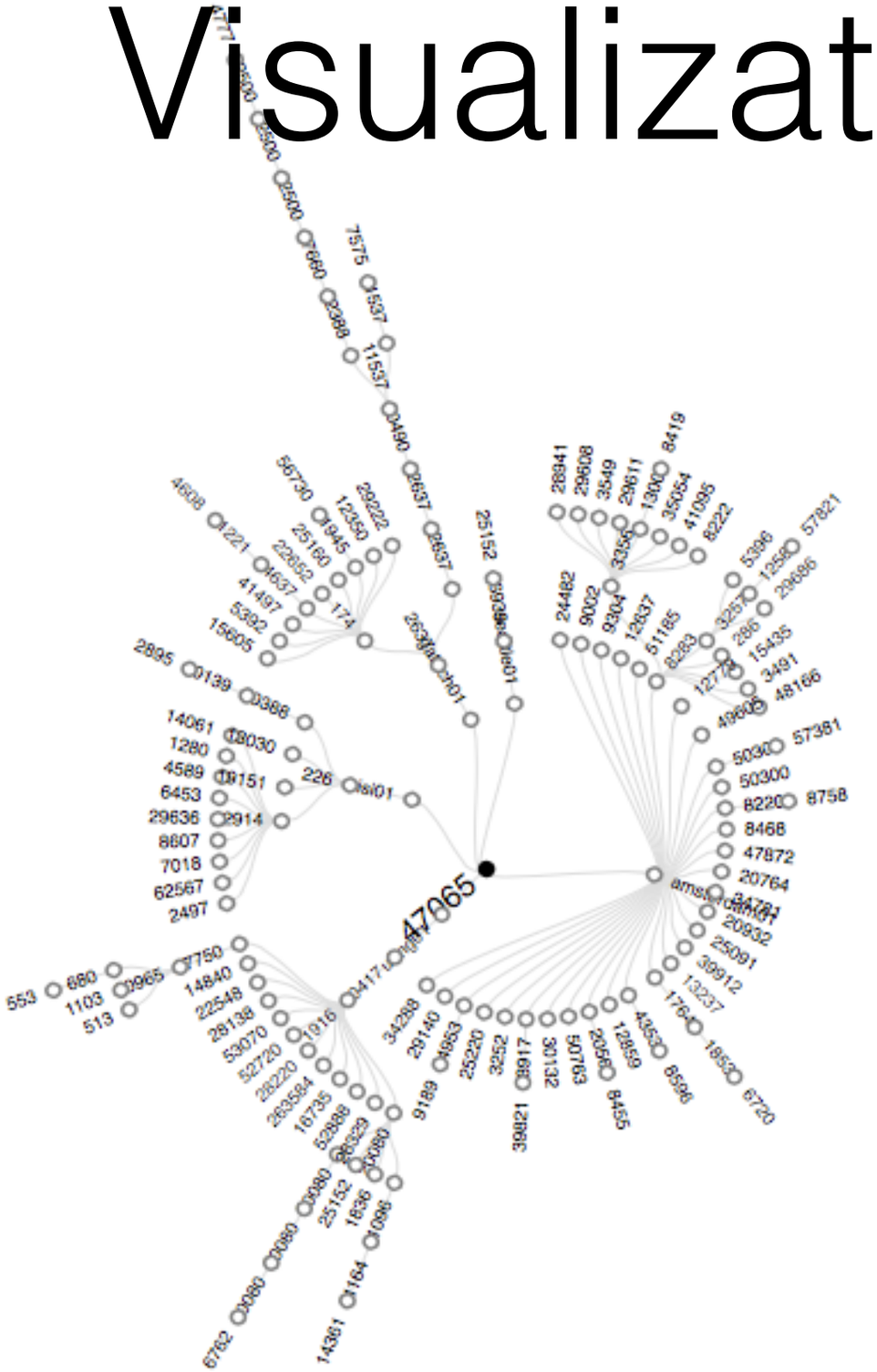


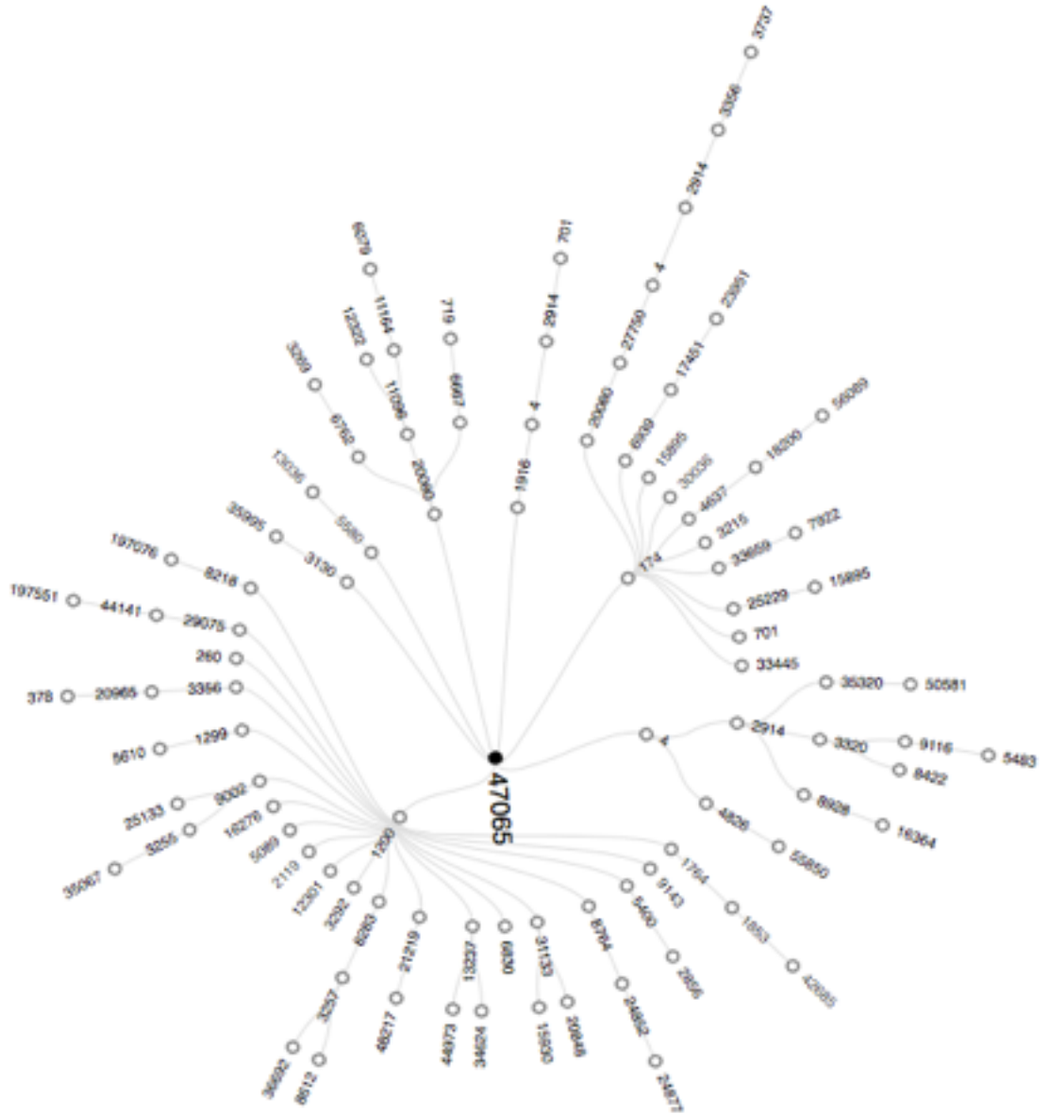
Monitoring Performance

Does location matter more than number of sites?



Visualization Helps!





Lessons Learned

- Fully autonomous is very challenging
  - Mainly due to BGP agreements for new instances
  - Semi-autonomous is definitely possible
  - Testing environment can be very useful
- Measurements are very helpful
  - Uncover hidden problems and misconfigurations
  - Decide on best approaches
  - Major drawback: you have to implement them yourself
    - But **not** a real drawback, is it?

Anycast Testbed

- We are creating an **anycast research testbed**
  - Measurements, measurements, measurements...
  - We want to go as global as possible
  - Few sites already up and running
  - Traffic is research related and limited to eventual ICMP (pings), traceroutes, and DNS requests

- Resources allocated by SURFnet and RIPE
  - 145.90.8.0/24
  - 2001:678::d0::/48
  - ASN 1133 (temporary - University of Twente, NL)

Anycast Testbed

Help us to build the testbed!

The more the merrier!

Thank you!

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Future

- DNS Anycast Security (DAS) project
  - How to use anycast to prevent and mitigate DDoS
  - Pros and cons of approaches
  - ...