RIPE Atlas

Serge Radovcic
RIPE NCC
sr@ripe.net

Introduction

RIPE Atlas:

- So what is an Atlas? = a collection of Maps!
- That's why we called it Atlas, ***RIPE Atlas***
- A next generation Internet measurement network
  - To scale to thousands of measurement nodes
  - Potentially "be everywhere" and ready to run different measurements for ***YOU***
  - We started in Nov 2010, and we are still building it and continually exploring the possibilities of it

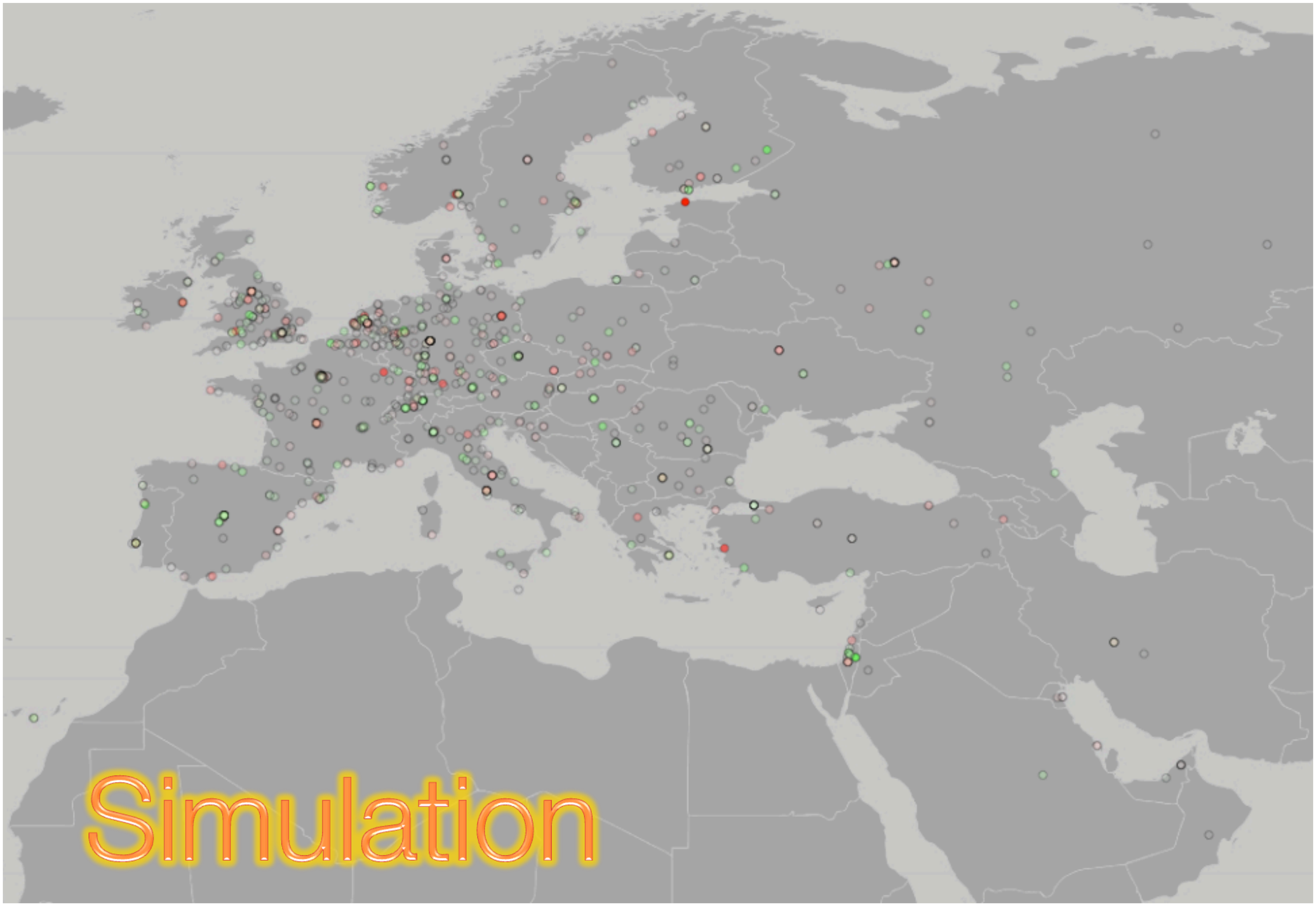
Light Map of Europe (thanks to NASA)

Introduction

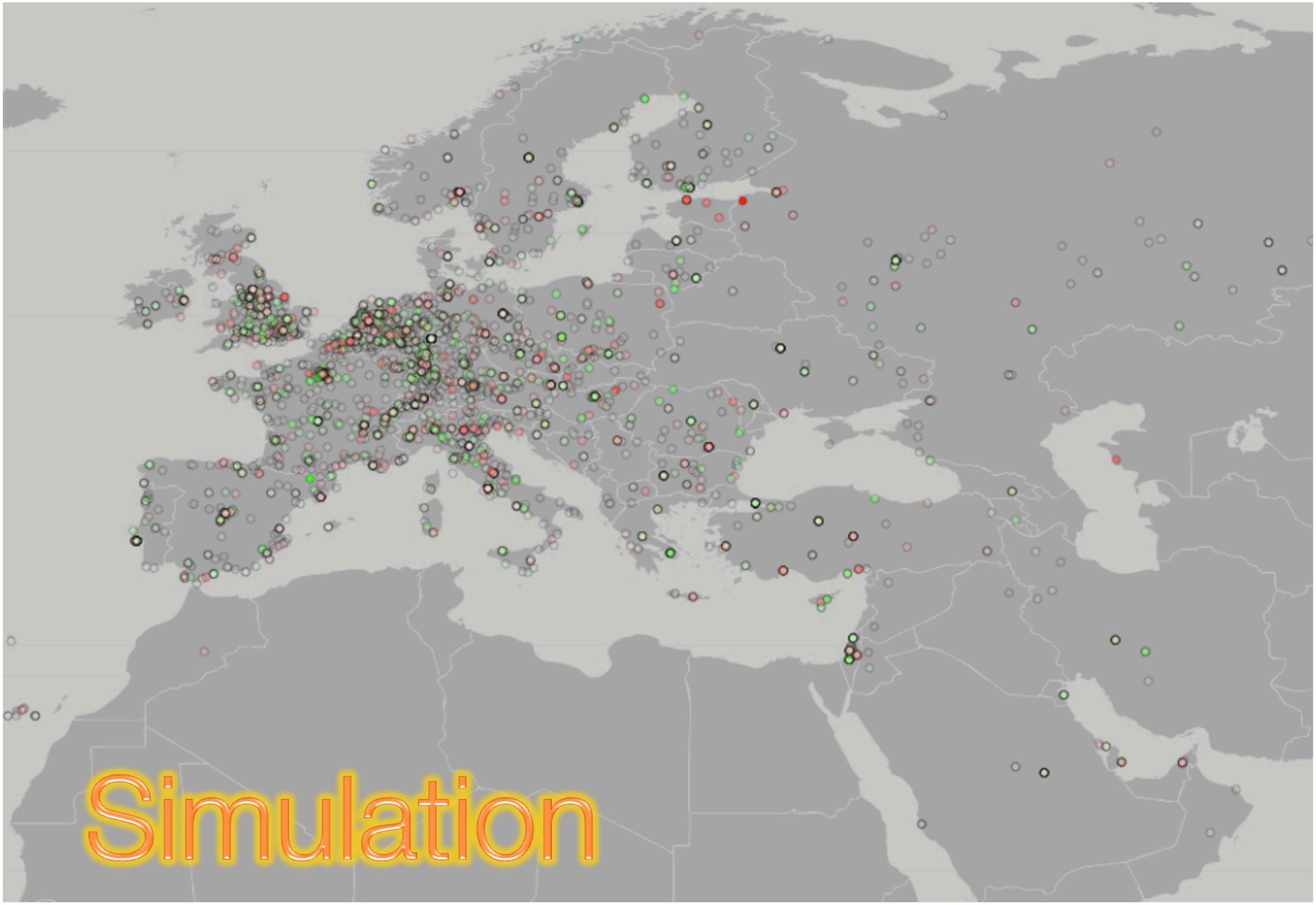
So how many probes do we need?

- To gauge the sort of network that we would need!
  - We took a look at all the IP prefixes that RIPE NCC has allocated and then geolocated them
  - We then created a script to randomly plot some dots on a map of those IP prefixes
  - We randomly colored those dots from green to red
  - With an emphasis on highlighting one IP prefix
  - And we got the following results.....

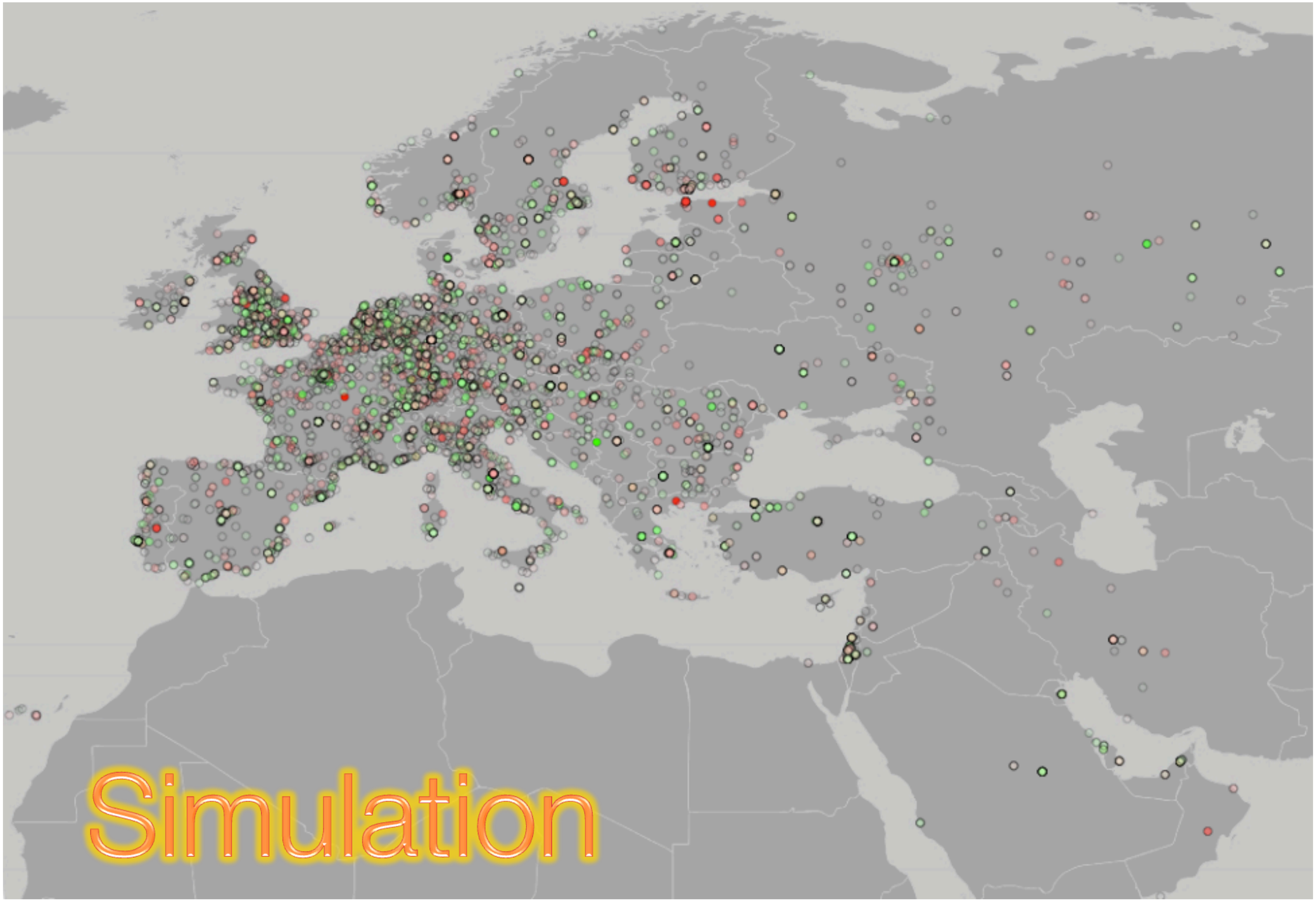
Intuition: 1000 Probes



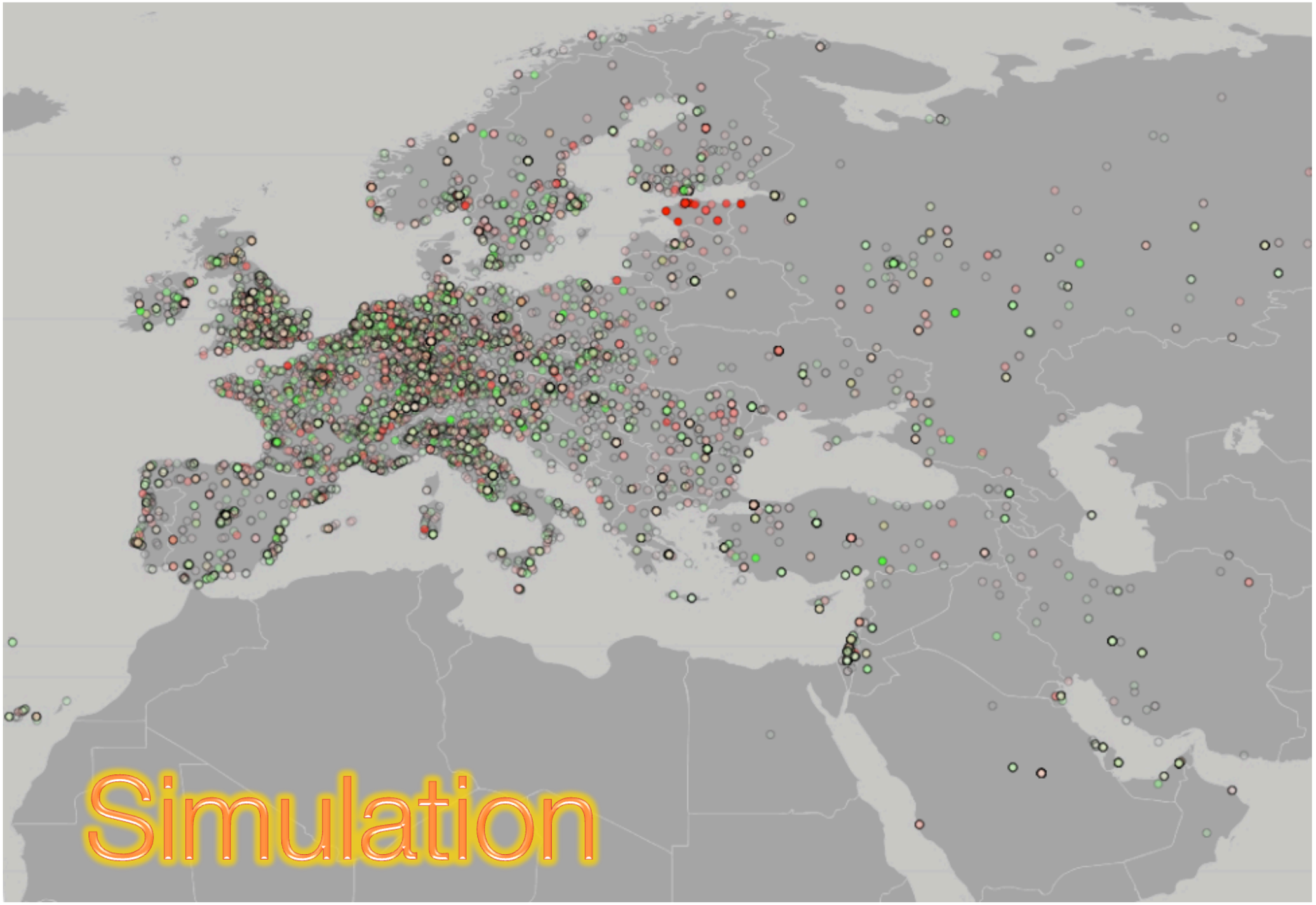
Intuition: 5000 Probes



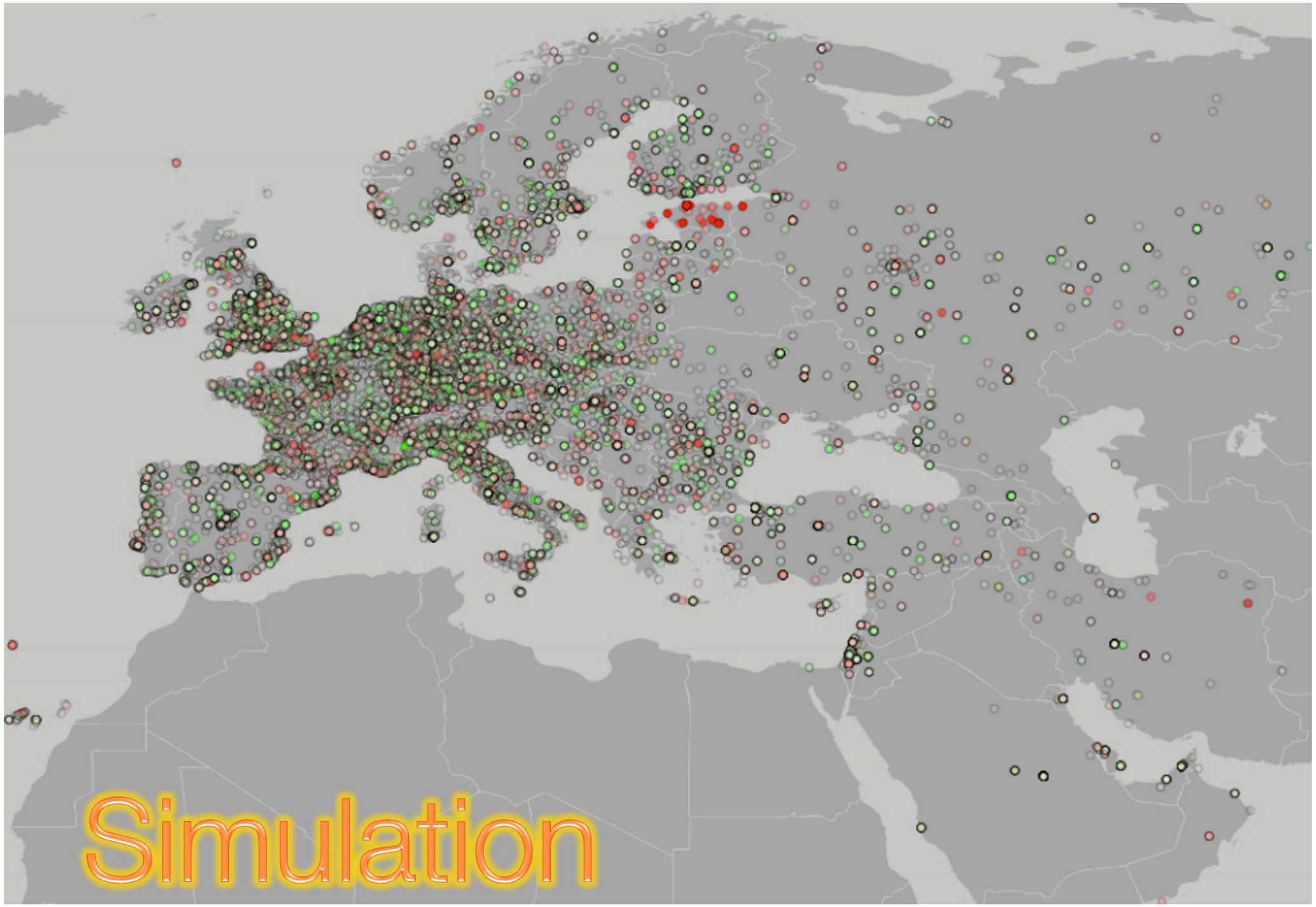
Intuition: 10k Probes



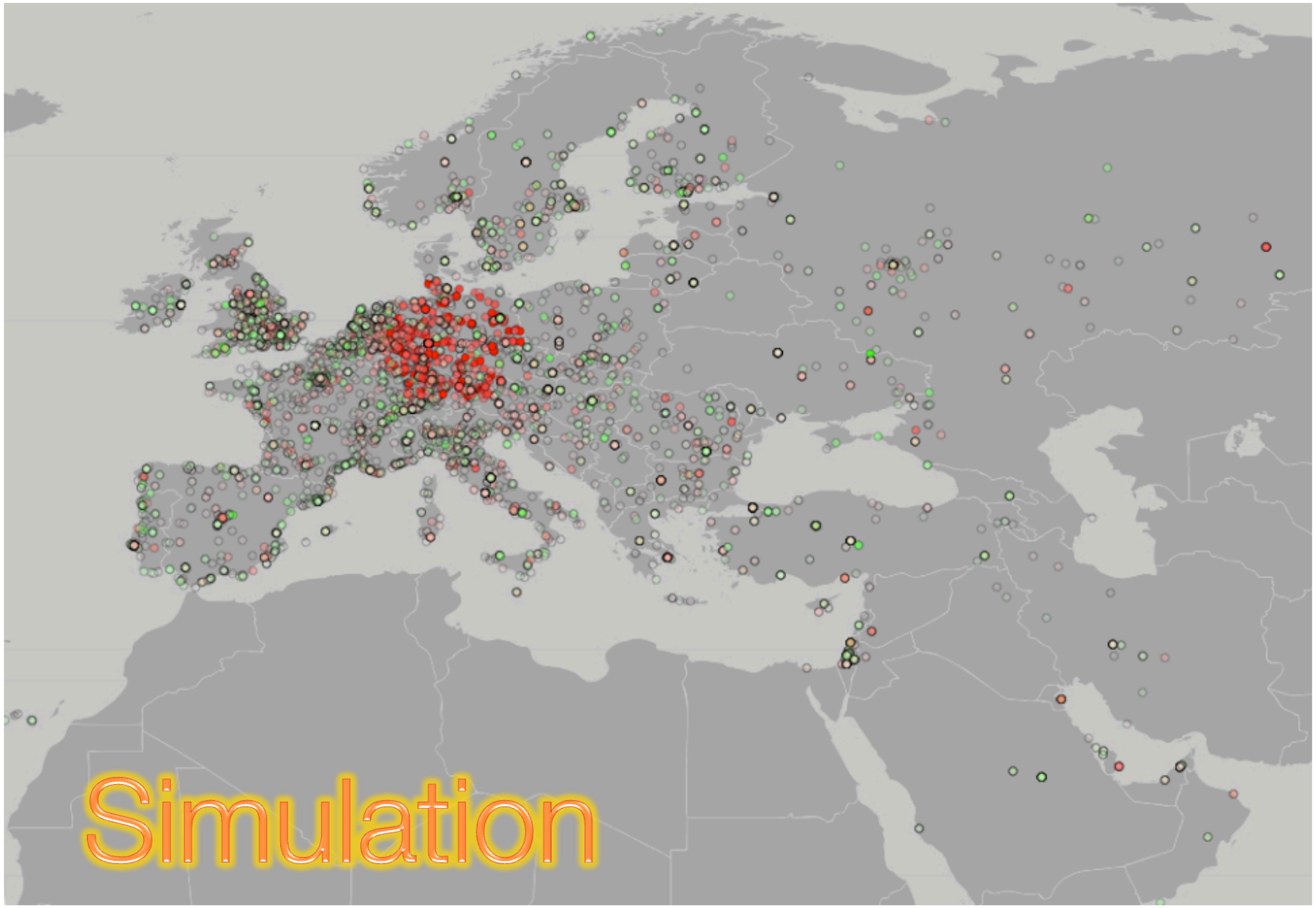
Intuition: 20k Probes



Intuition: 50k Probes



Intuition: **10k** Probes & 1 AS



Ambitious Community Effort

Instead of building small, separate, individual & private infrastructures, why not build a huge common infrastructure

that serves ***both*** the private goals

and the community goals.

Ambitious Community Effort

- Individual Benefits
  - Less expensive than rolling your own
  - More vantage points available
  - More data available
- Community Benefits
  - Unprecedented situational awareness
  - Wealth of data, …

Why not deploy a SW version?

- Many of the host machines will *not run continuously* (24/7) over long periods

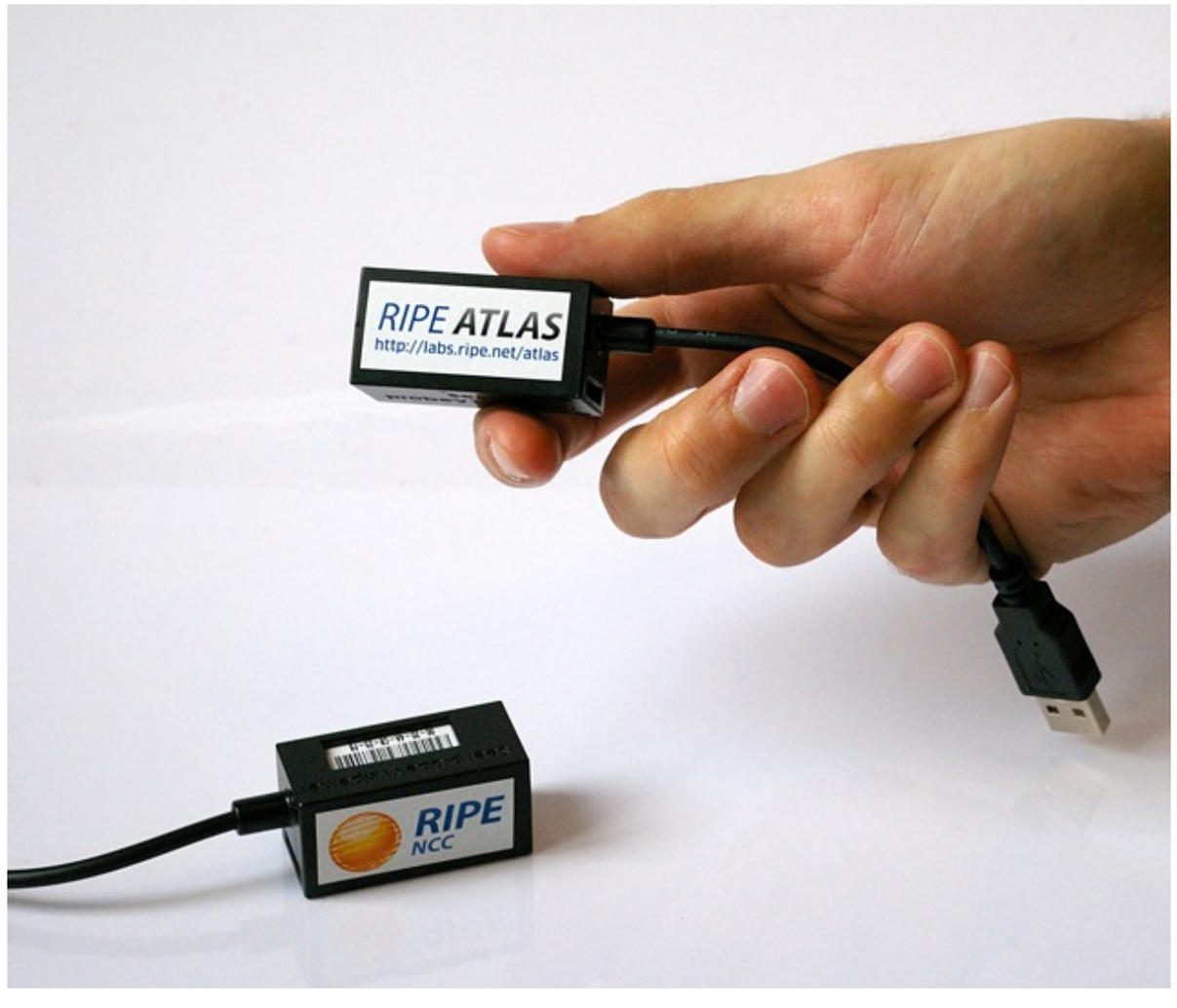
- The measurements would be *influenced* by sharing systems and network resources with other applications on the host computer

- Software *can* cause host machines to crash

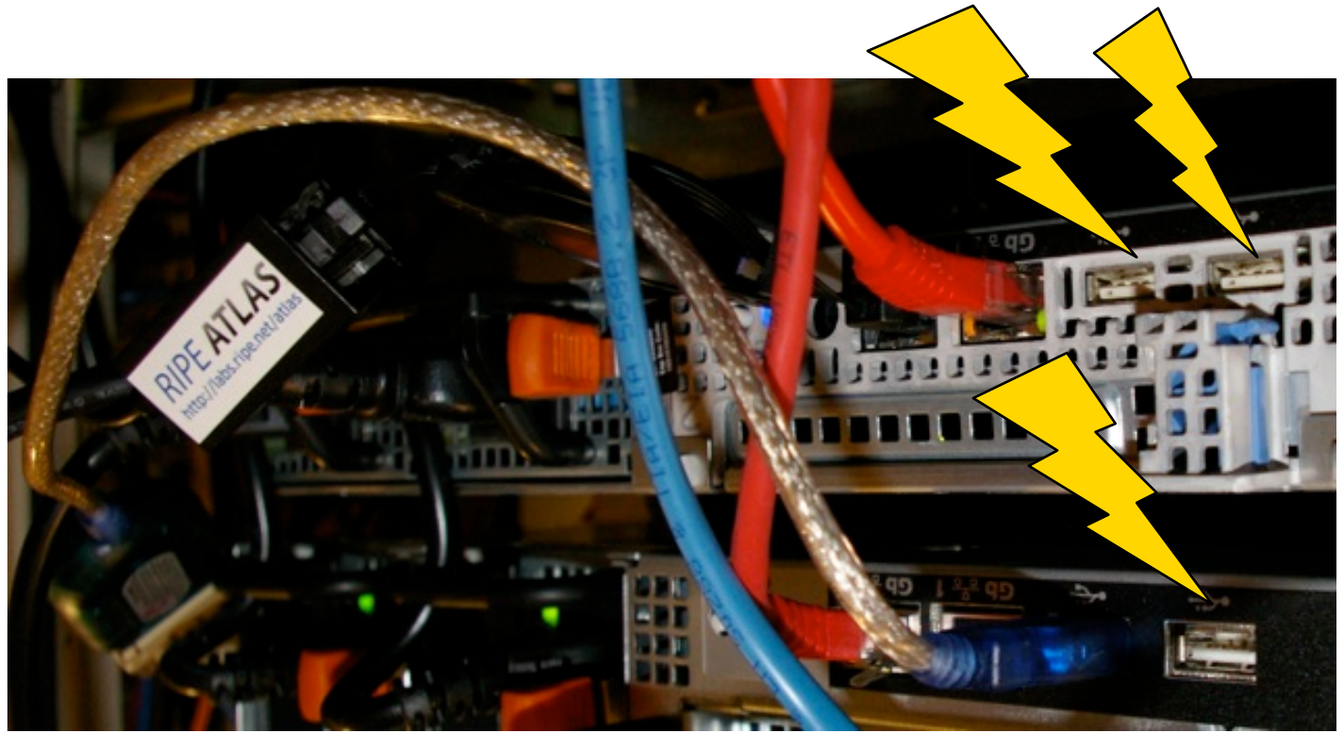
- SW may be easier to tamper with

Intuition -> Plan

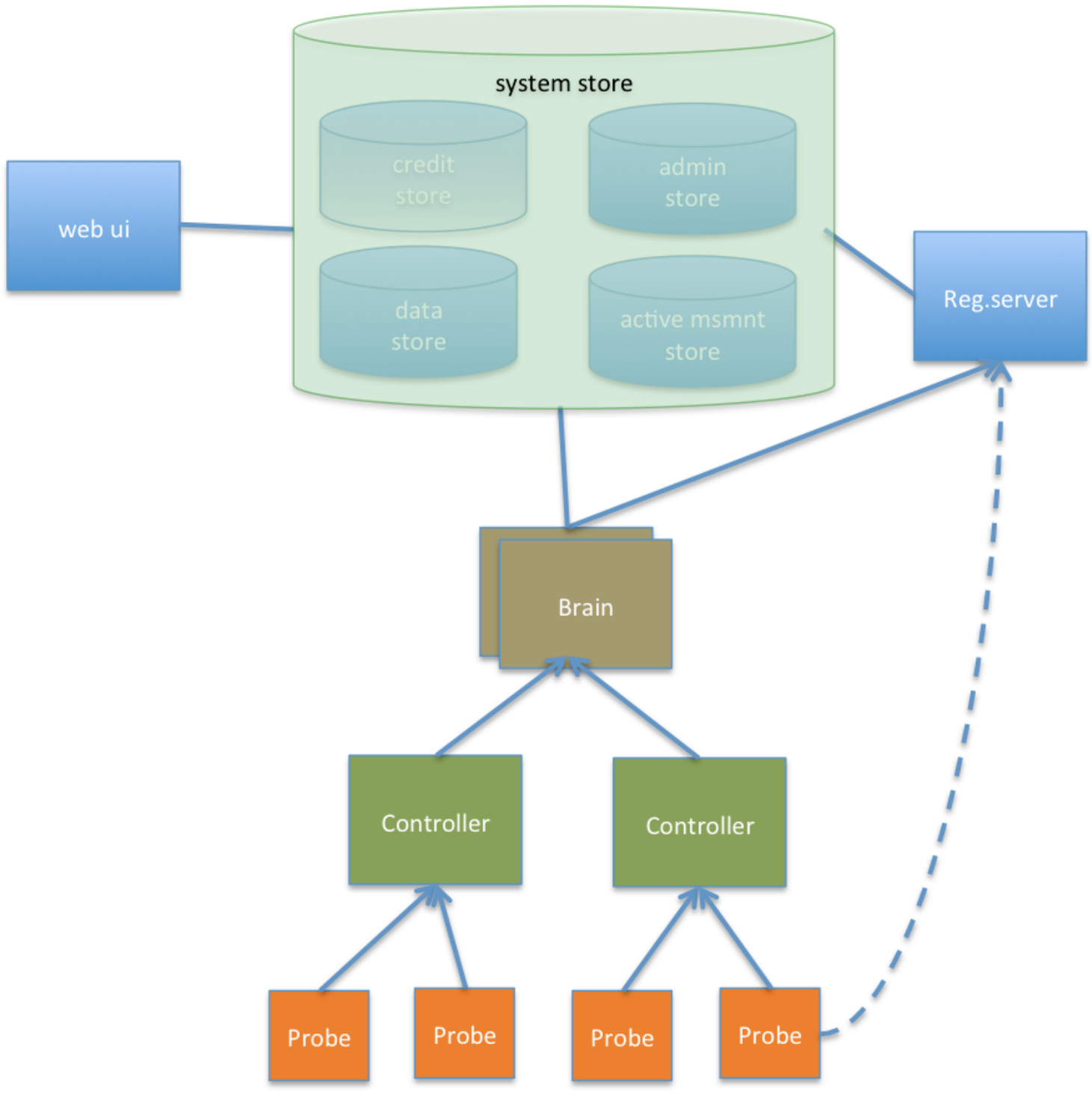
- For accurate maps we need lots of probes
- Deploying very many TTM boxes is *too expensive*
- Smaller probes
- Easily deployable
- USB powered
- 24 x 365 capable



Probe Deployments



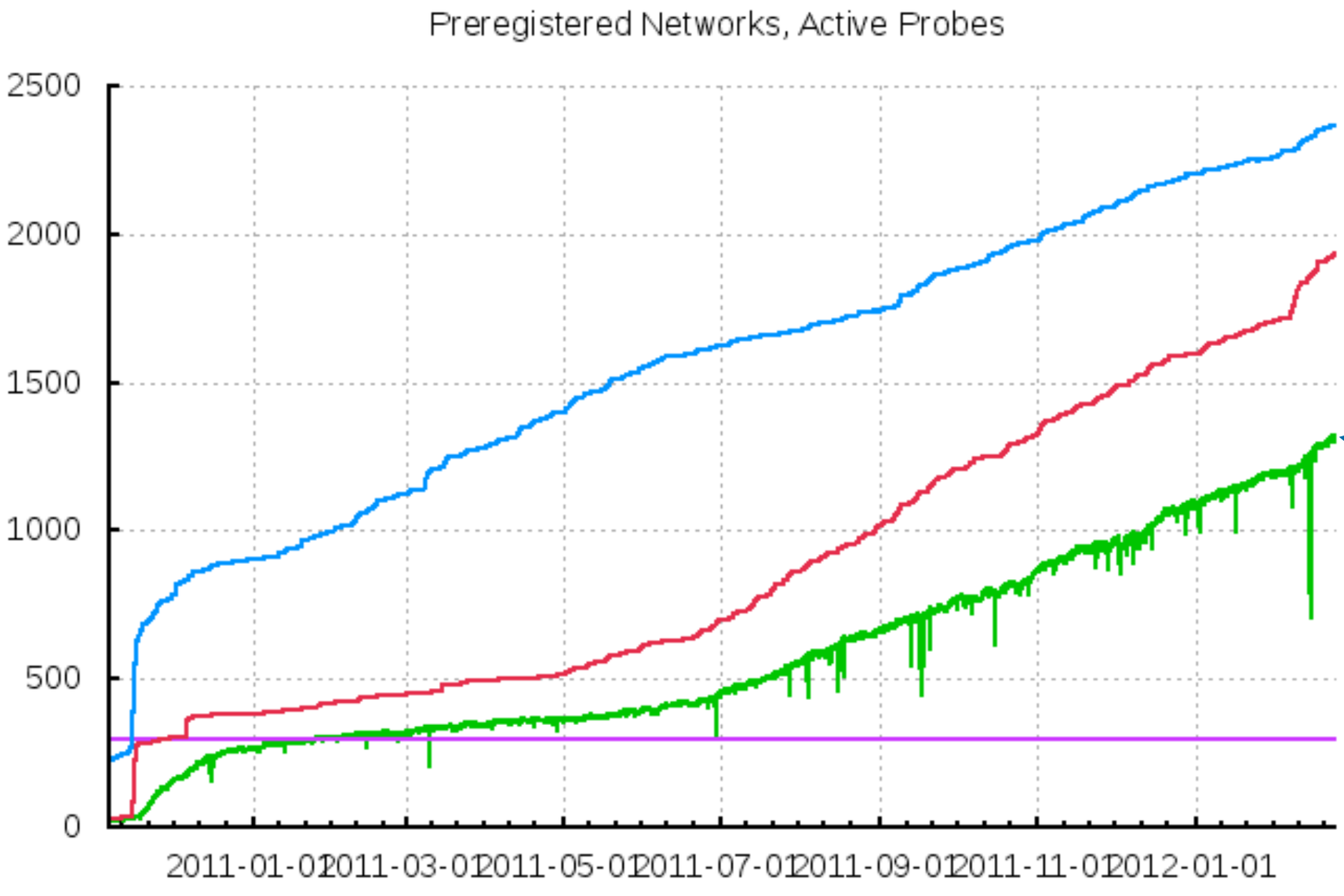
RIPE Atlas - Overall Architecture



RIPE Atlas - Security aspects

- Probes have hardwired trust material (registration server addresses / keys)
- The probes don’t have any open ports, they only initiate connections
  - This works fine with NATs too
- Probes don’t listen to local traffic, there are no passive measurements running
  - There’s no snooping around
- And if in doubt, you can always just pull the plug!

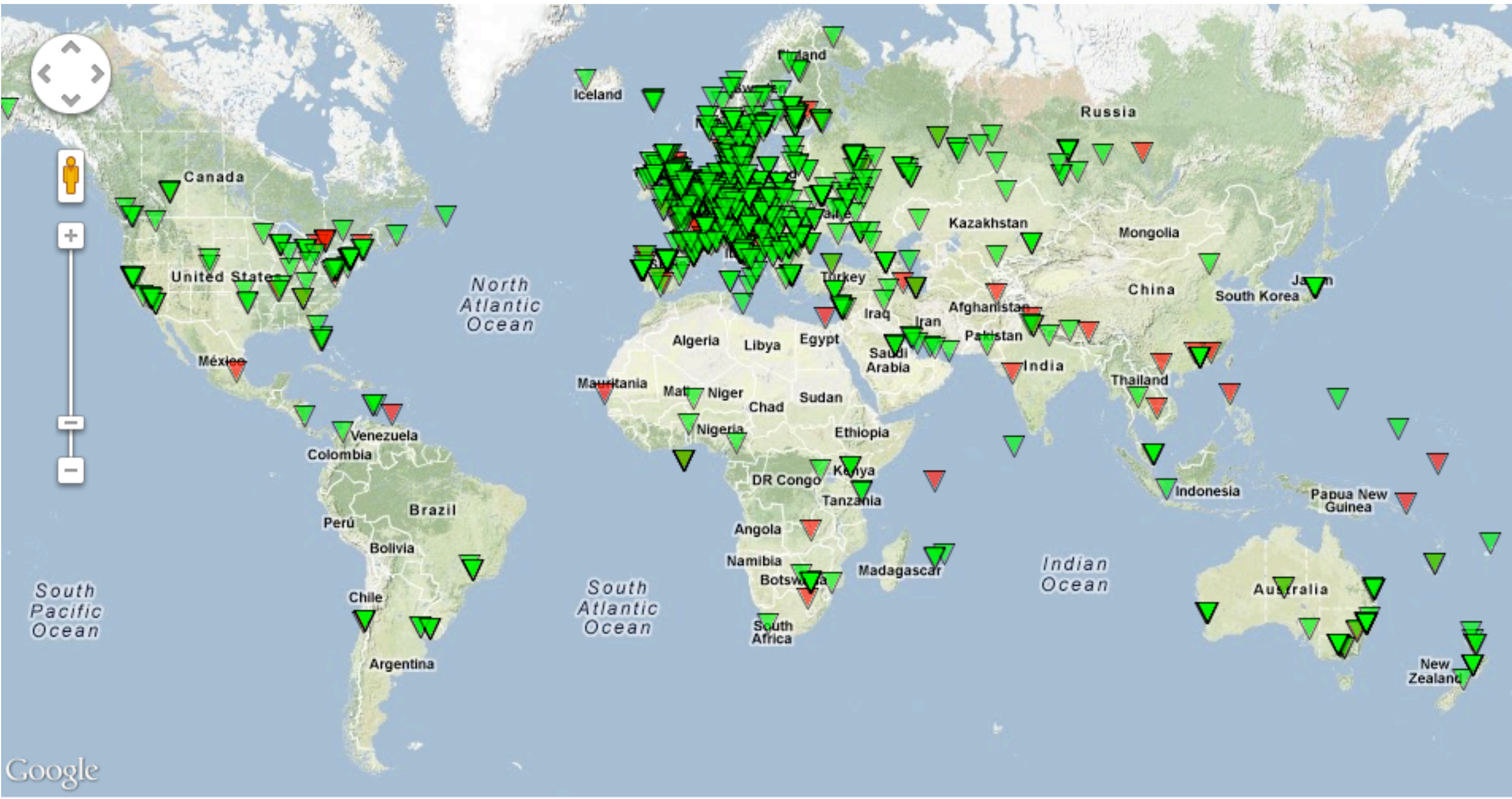
Network extent



Today, about 1,300 probes "Up"

NOT a Simulation

Network extent - Global - Feb 2011

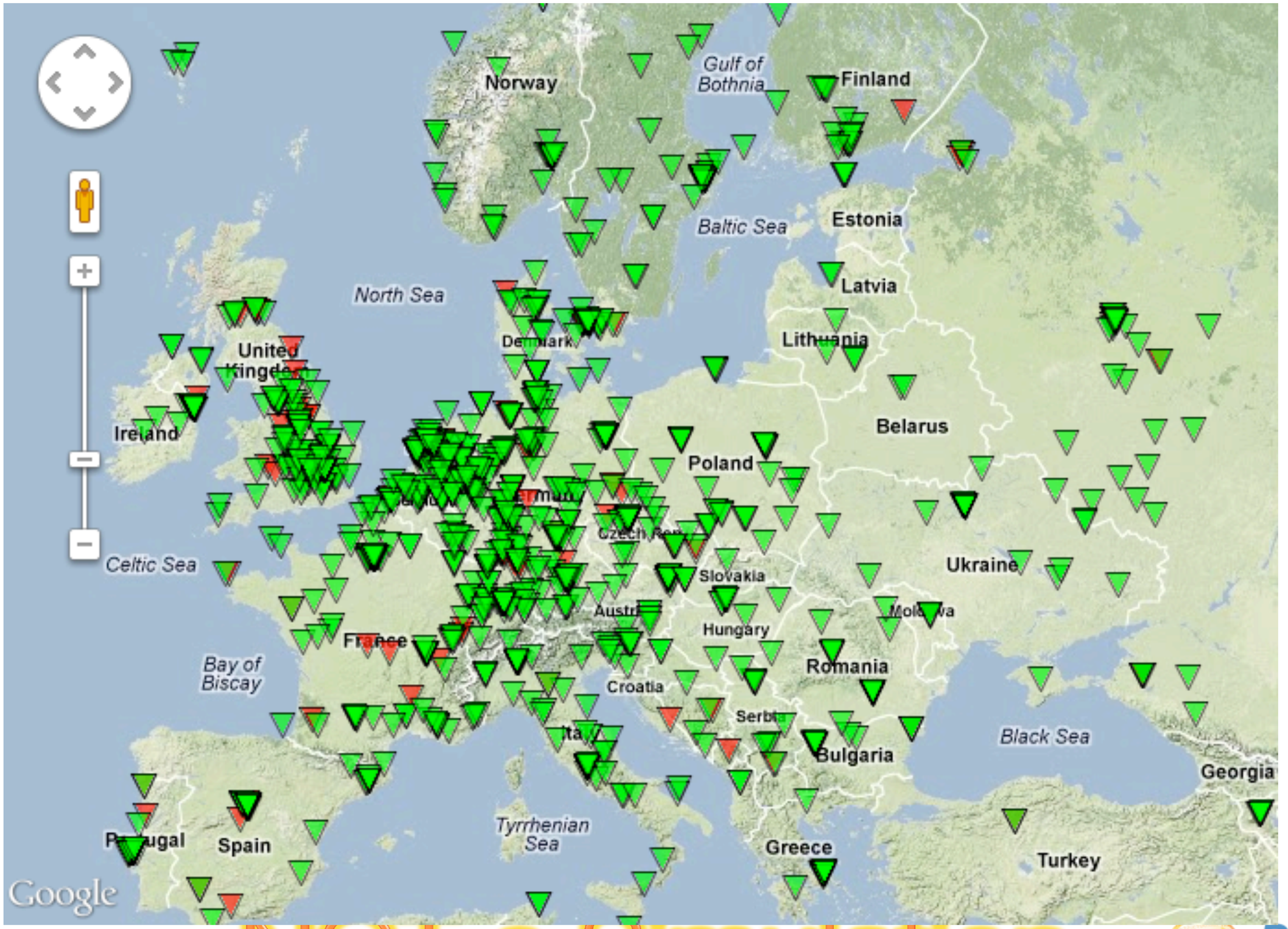


NOT a Simulation

Network extent - Europe - Feb 2011

NOT a Simulation

Network extent - Europe - Feb 2012



NOT a Simulation

Network extent - Around India

NOT a Simulation

So what do they currently measure?

- Built in probe measurements to all root servers:

  - Shows which root DNS server instance the probe ends up querying

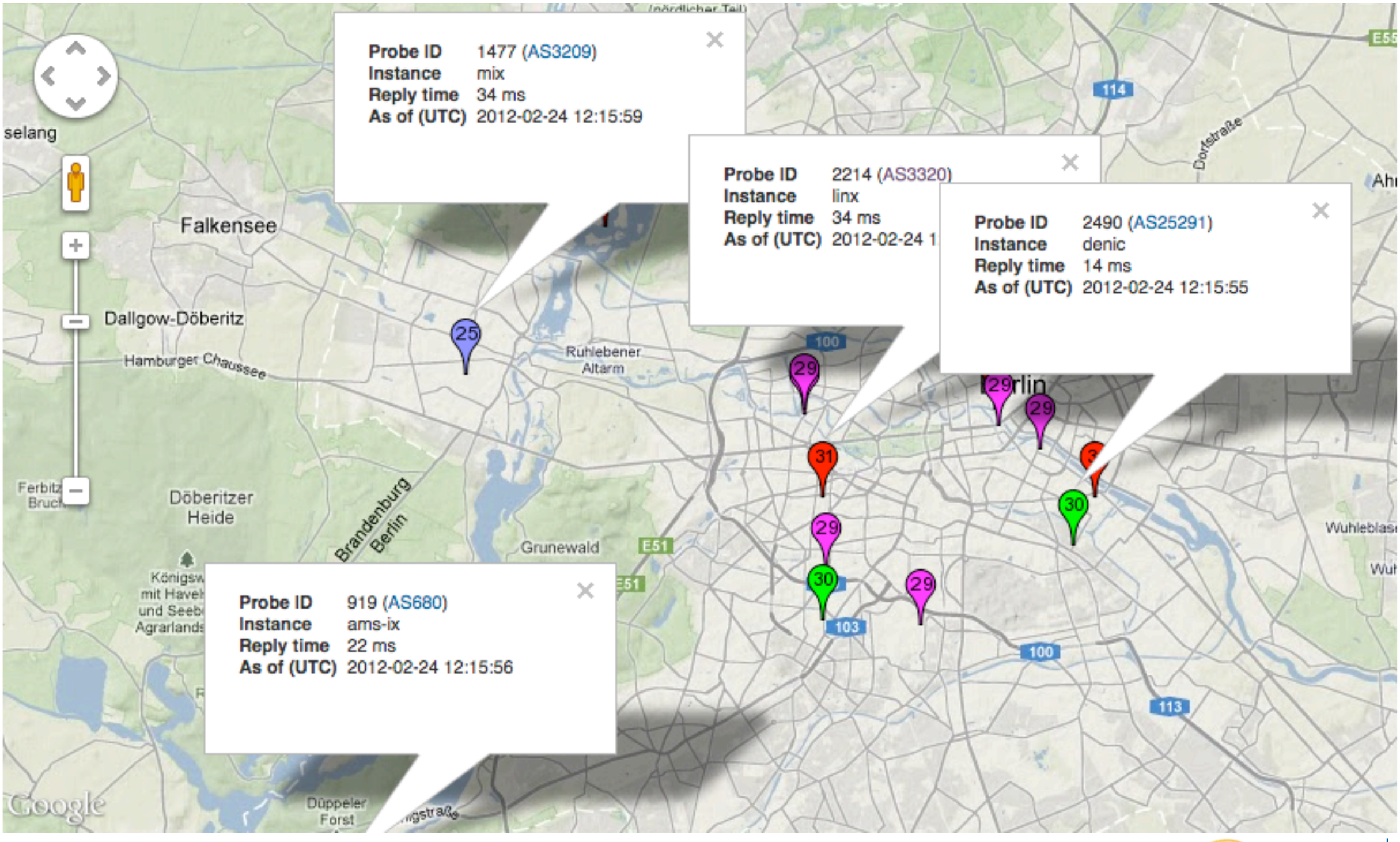
  - Shows the response time to all root server instances and one can compare their performance

- RTT to specific targets

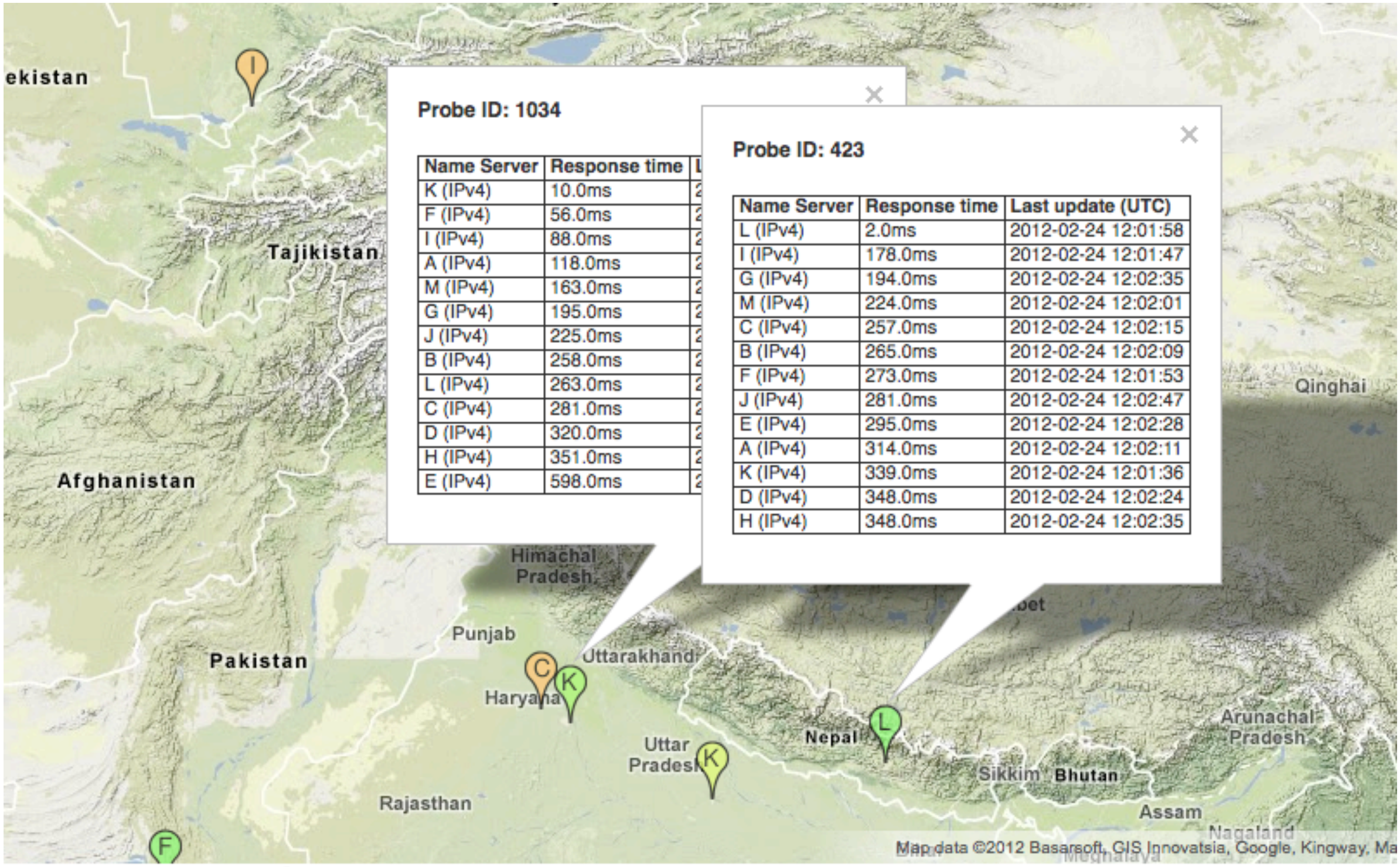
Speed of connections to ns.ripe.net

Speed of connections to ns.ripe.net

K-root instance query comparison (Berlin, DE)



Root server response comparison



Probe ID: 1034

Name Server	Response time	L
K (IPv4)	10.0ms	2
F (IPv4)	56.0ms	2
I (IPv4)	88.0ms	2
A (IPv4)	118.0ms	2
M (IPv4)	163.0ms	2
G (IPv4)	195.0ms	2
J (IPv4)	225.0ms	2
B (IPv4)	258.0ms	2
L (IPv4)	263.0ms	2
C (IPv4)	281.0ms	2
D (IPv4)	320.0ms	2
H (IPv4)	351.0ms	2
E (IPv4)	598.0ms	2

Probe ID: 423

Name Server	Response time	Last update (UTC)
L (IPv4)	2.0ms	2012-02-24 12:01:58
I (IPv4)	178.0ms	2012-02-24 12:01:47
G (IPv4)	194.0ms	2012-02-24 12:02:35
M (IPv4)	224.0ms	2012-02-24 12:02:01
C (IPv4)	257.0ms	2012-02-24 12:02:15
B (IPv4)	265.0ms	2012-02-24 12:02:09
F (IPv4)	273.0ms	2012-02-24 12:01:53
J (IPv4)	281.0ms	2012-02-24 12:02:47
E (IPv4)	295.0ms	2012-02-24 12:02:28
A (IPv4)	314.0ms	2012-02-24 12:02:11
K (IPv4)	339.0ms	2012-02-24 12:01:36
D (IPv4)	348.0ms	2012-02-24 12:02:24
H (IPv4)	348.0ms	2012-02-24 12:02:35

User Defined Measurement (UDM)

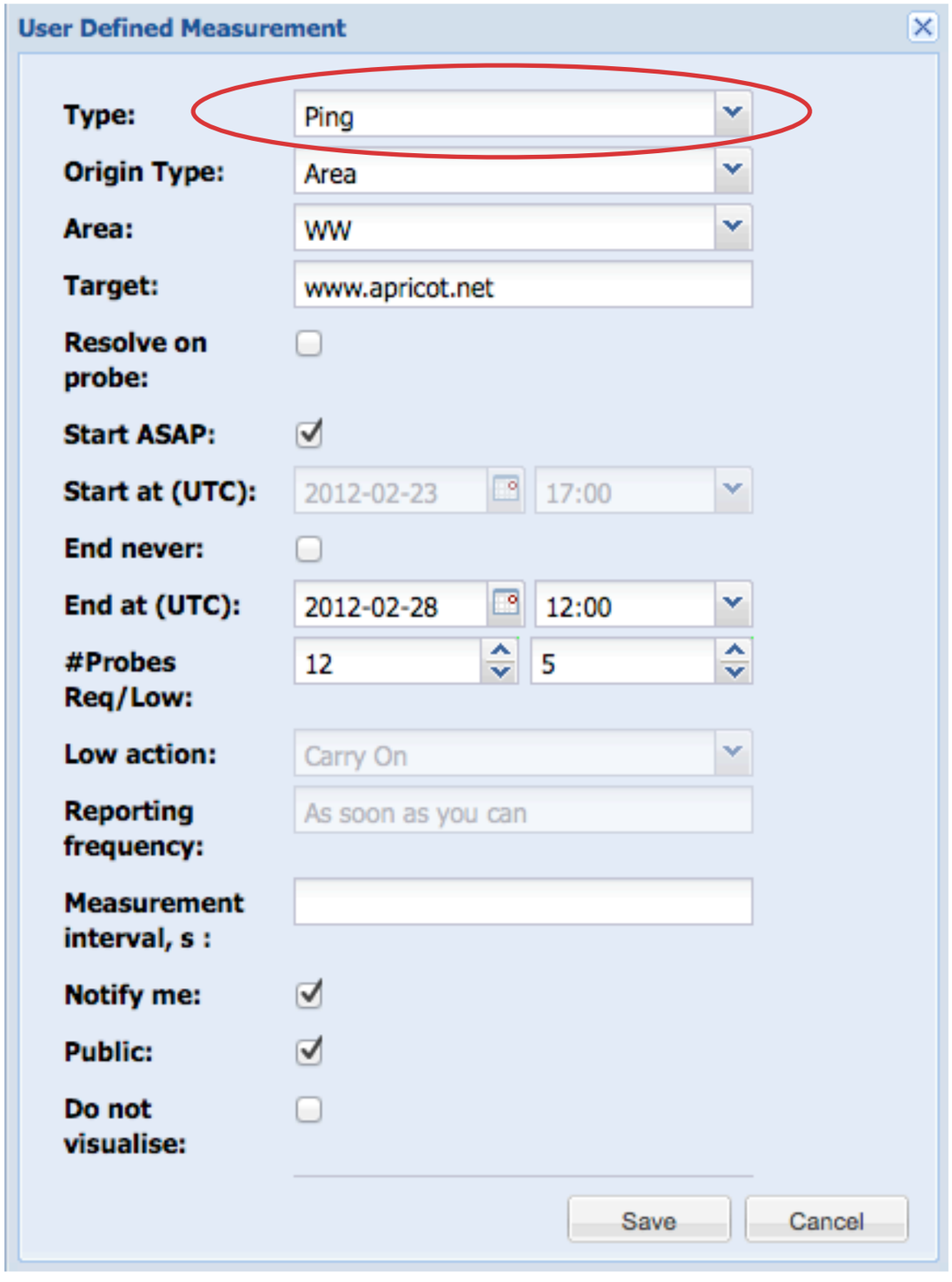
- Let's you, the host, take control

- You define your measurements and we role them out for you

- You don't just measure from your probe, but potentially, any of the probes on the infrastructure

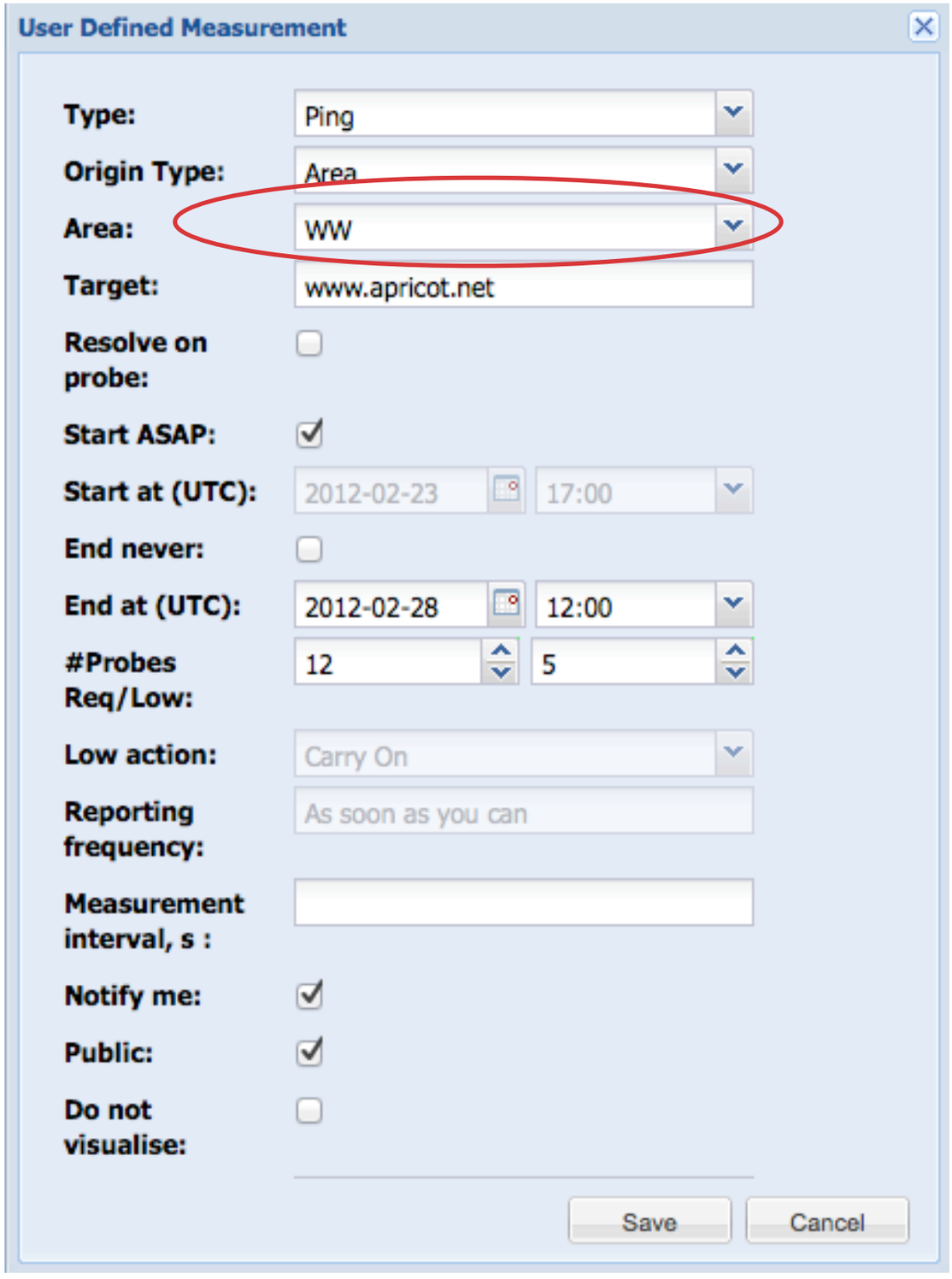
- Yes, any of the thousands of probes spread all across the globe - and ***we*** store all these measurements in our DB!

UDM (beta): Type of Measurement



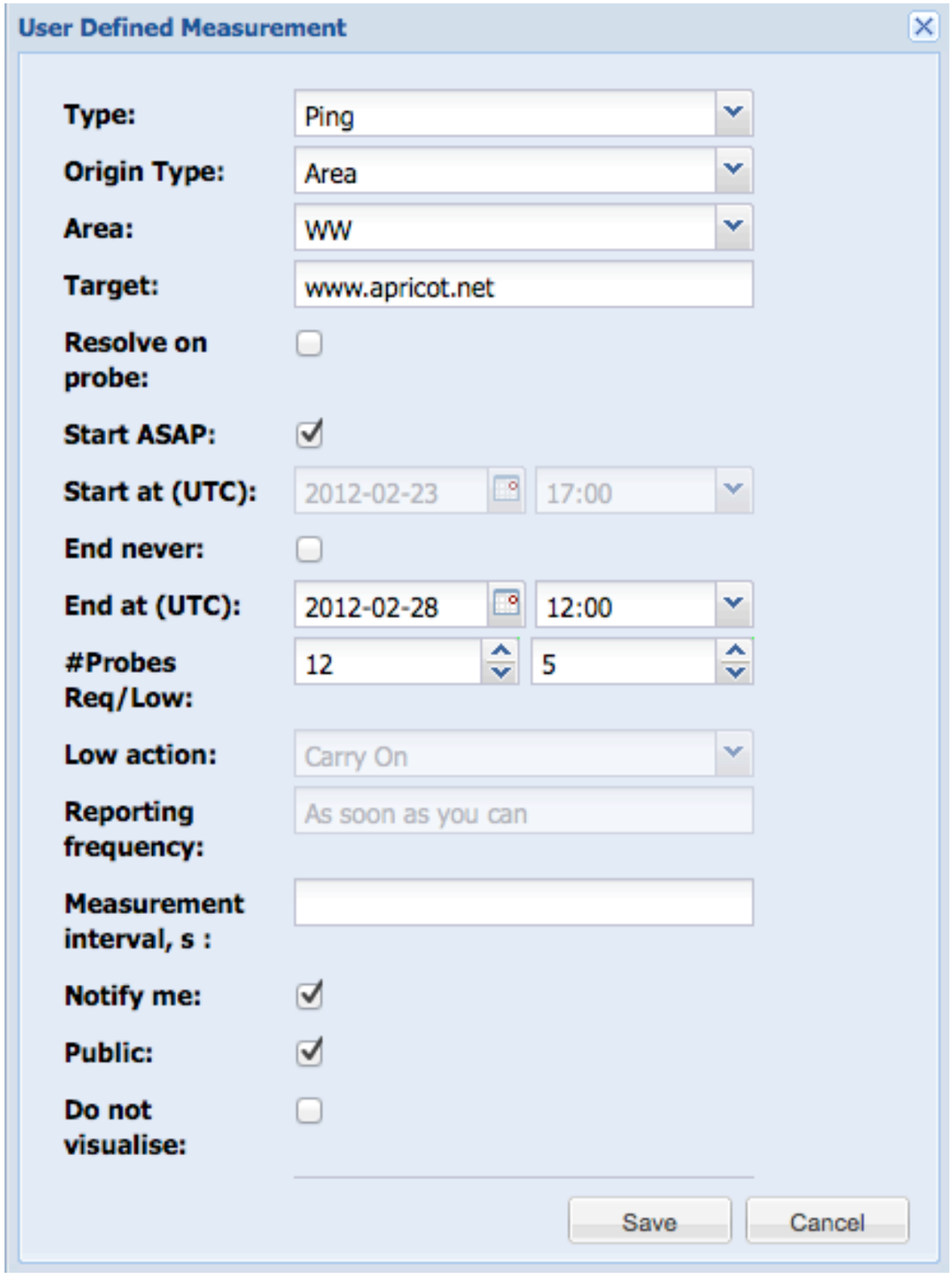
- Currently:
  - Ping (v4/v6)
  - Traceroute (v4/v6)
- Upcoming:
  - DNS query

UDM (beta): Choosing the “Origin”



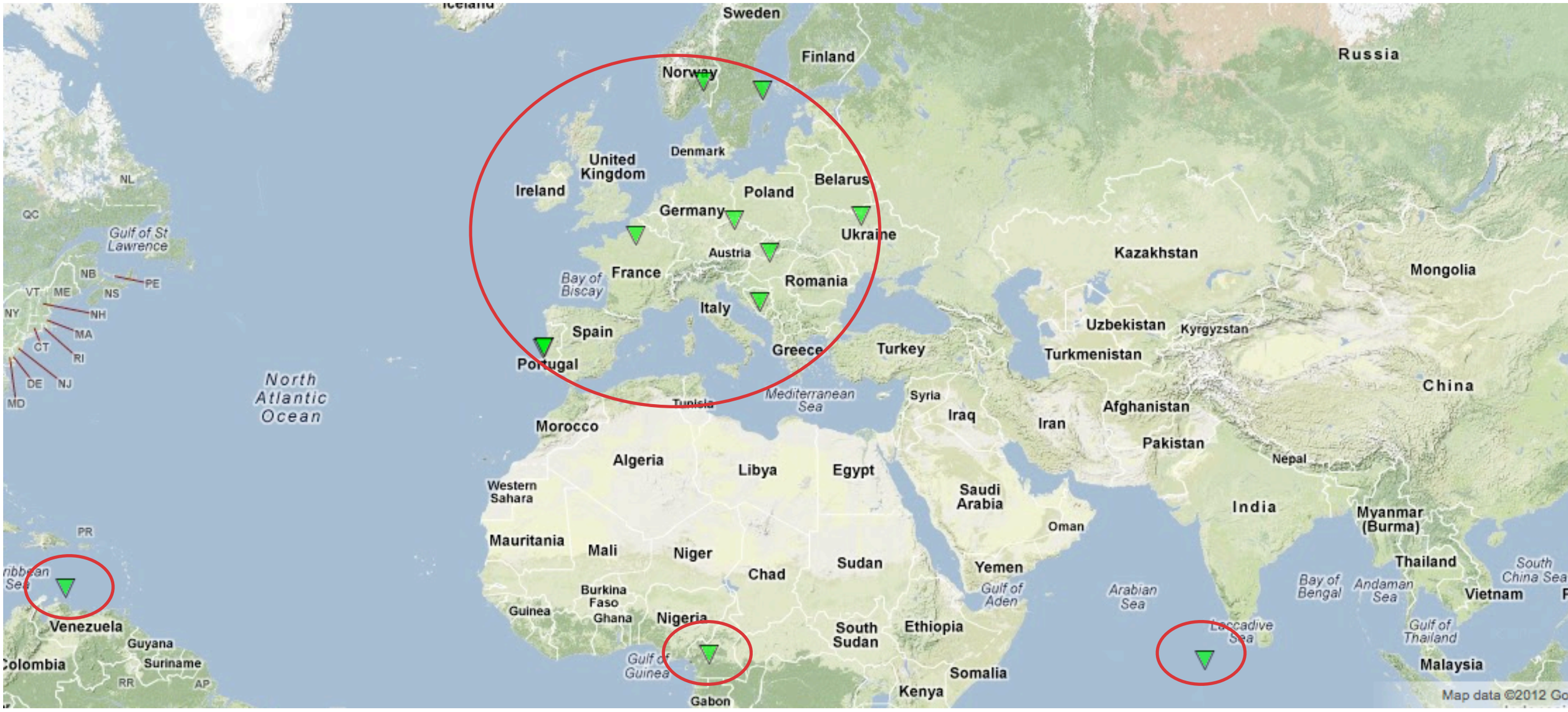
- Currently:
  - Worldwide
  - Region
  - Country
  - Probe
- Upcoming:
  - AS
  - Prefix

UDM (beta): and more.....



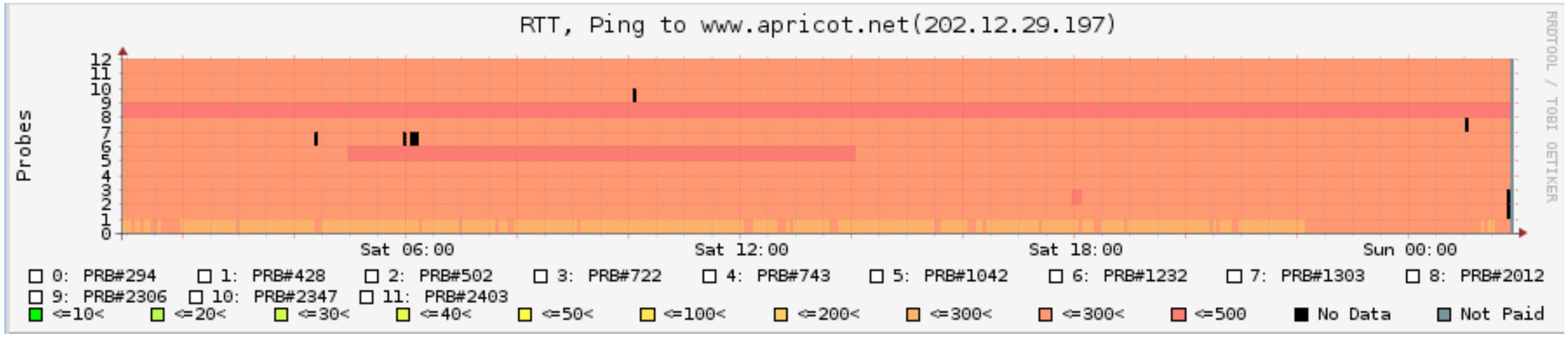
- Target
- Start
- End
- # Probes
- more...

UDM (beta): Visualisation

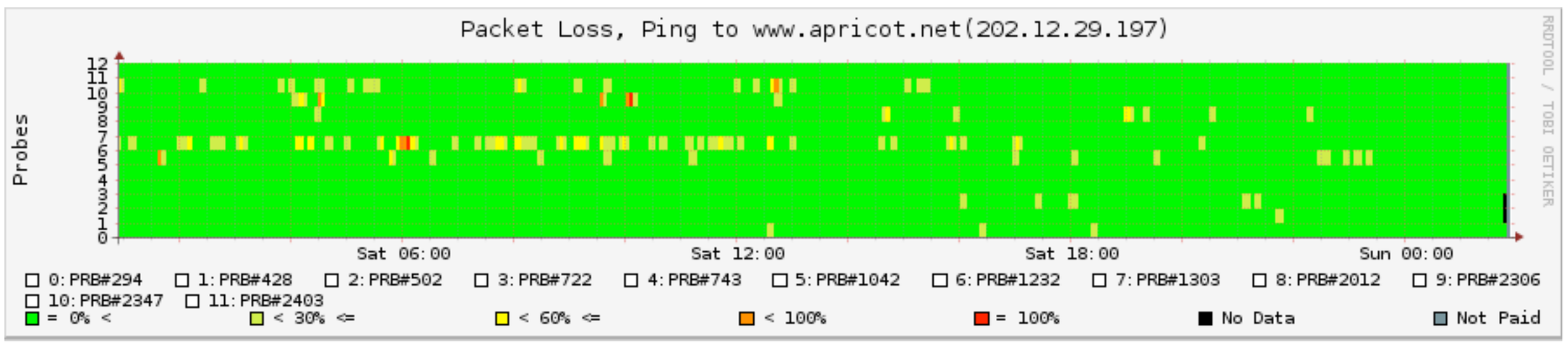


So what do you see?

RTT per probe



Packet loss per probe



Hosting = Credits = Measurements

- We cannot be everywhere without your help

Become a probe host!

- Donate a fraction of your bandwidth
- Donate a very small amount of electricity

You get:

- Recognition
- Access to fixed measurements from your probe
- Credits = Measurements from any probe (Q2/11)

Sponsorship = Credits = Measurements

- 50k probes too expensive for RIPE NCC alone
- Sponsorship Plans:

2K €	8 probes
4K €	16 probes
	…
64K €	256 probes

- Recognition and many more credits
- Access to fixed measurements from probes now
- Credits = Measurements from any probe (Q2/11)

Sponsorship = Credits = Measurements

- 50k probes too expensive for RIPE NCC alone
- Sponsorship Plans:

that is 2048€ 2K €	8 probes
4K €	16 probes
geek compatible pricing℠	…
64K €	256 probes

- Recognition and many more credits
- Access to fixed measurements from probes now
- Credits = Measurements from any probe (Q2/11)

So what's next?

- More features, more measurements, more UDM capabilities and refining the *credit* system

- The *current plan* is to give all our *members* access to the UDMs whether they are hosts or not

- More probes hosts

- More sponsors

- And me getting off the stage!!

Questions?

atlas.ripe.net

RIPE NCC