RIPE Atlas

A Next Generation Measurement Architecture

Andreas Strikos
RIPE NCC Science Group
astrikos@ripe.net

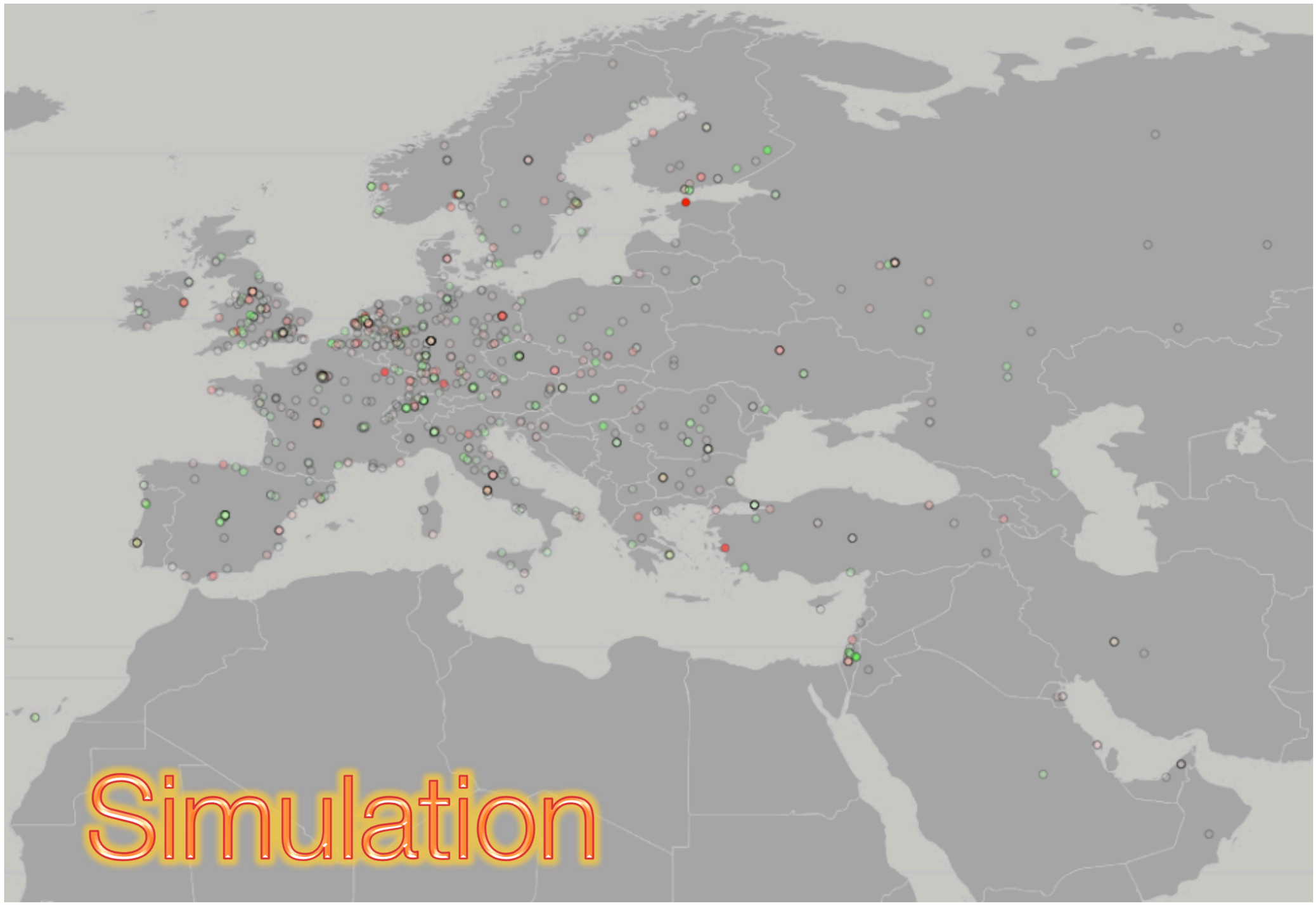
Introduction

RIPE Atlas:

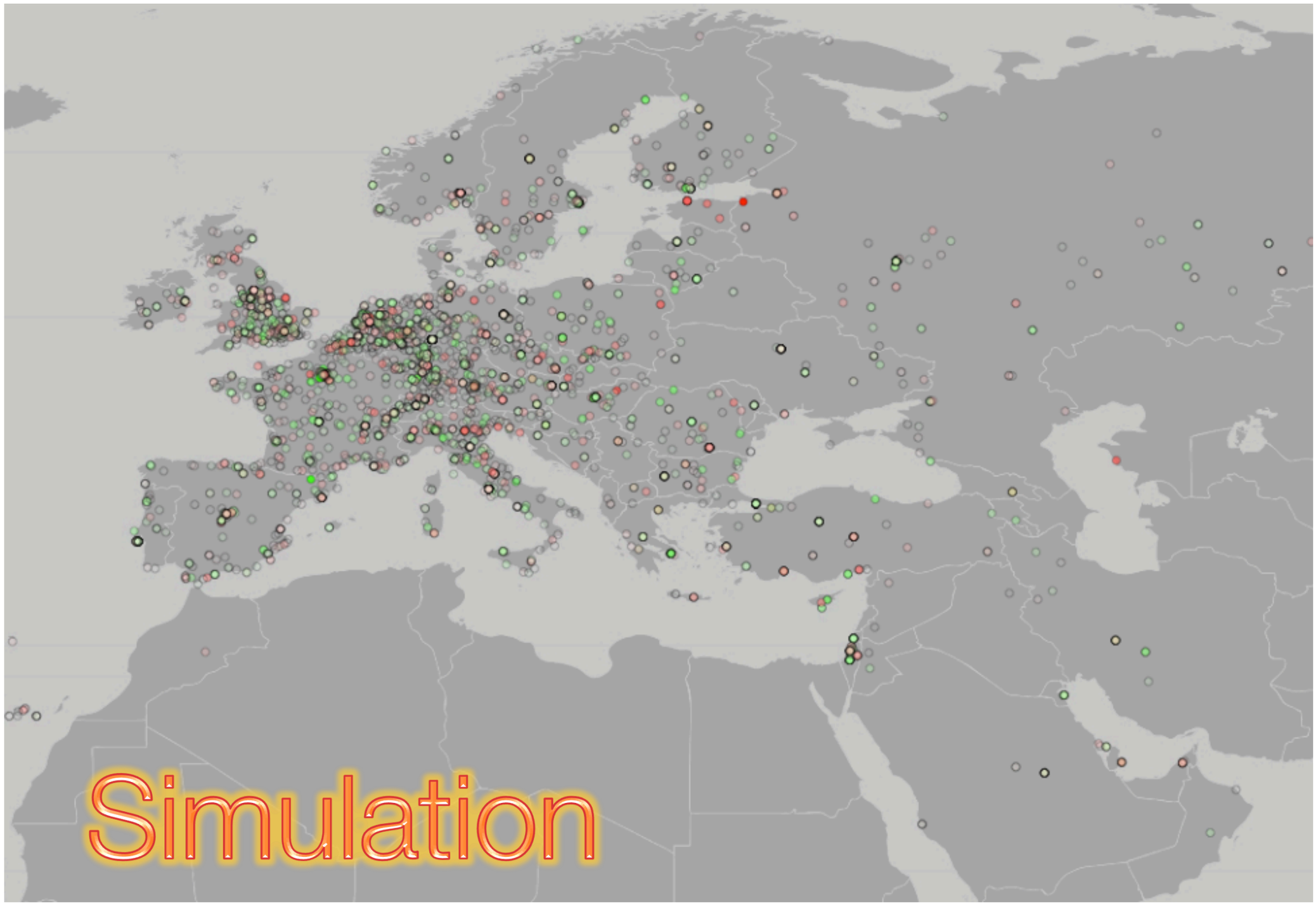
- There are many Atlases, this is *RIPE Atlas*
- A prototype system for a next generation Internet measurement network
  - To scale to thousands of measurement nodes
  - Potentially “be everywhere” and ready to run different measurements
  - Started last November, we’re still just building it and exploring possibilities

Light Map of Europe

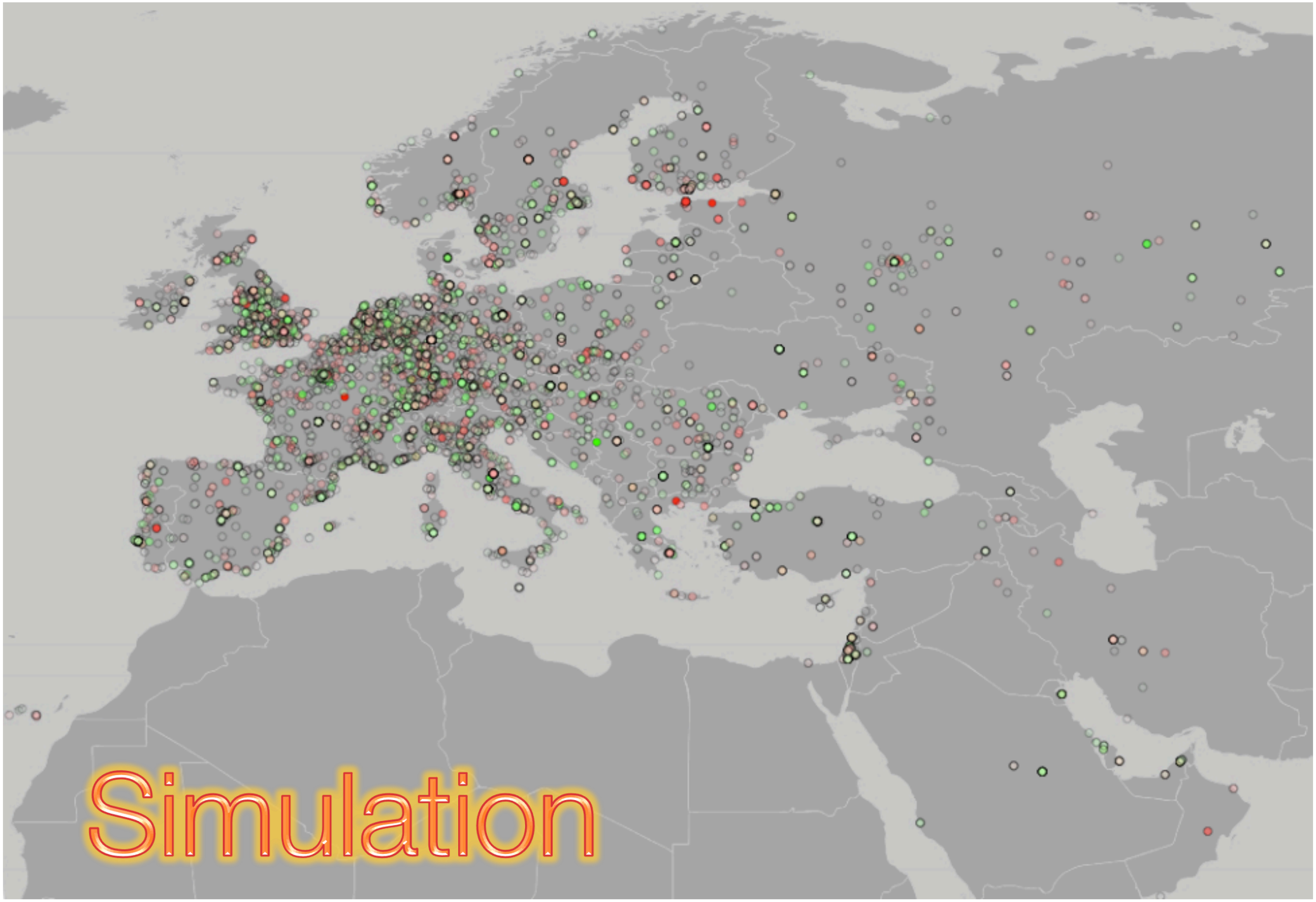
Intuition: 1000 Probes



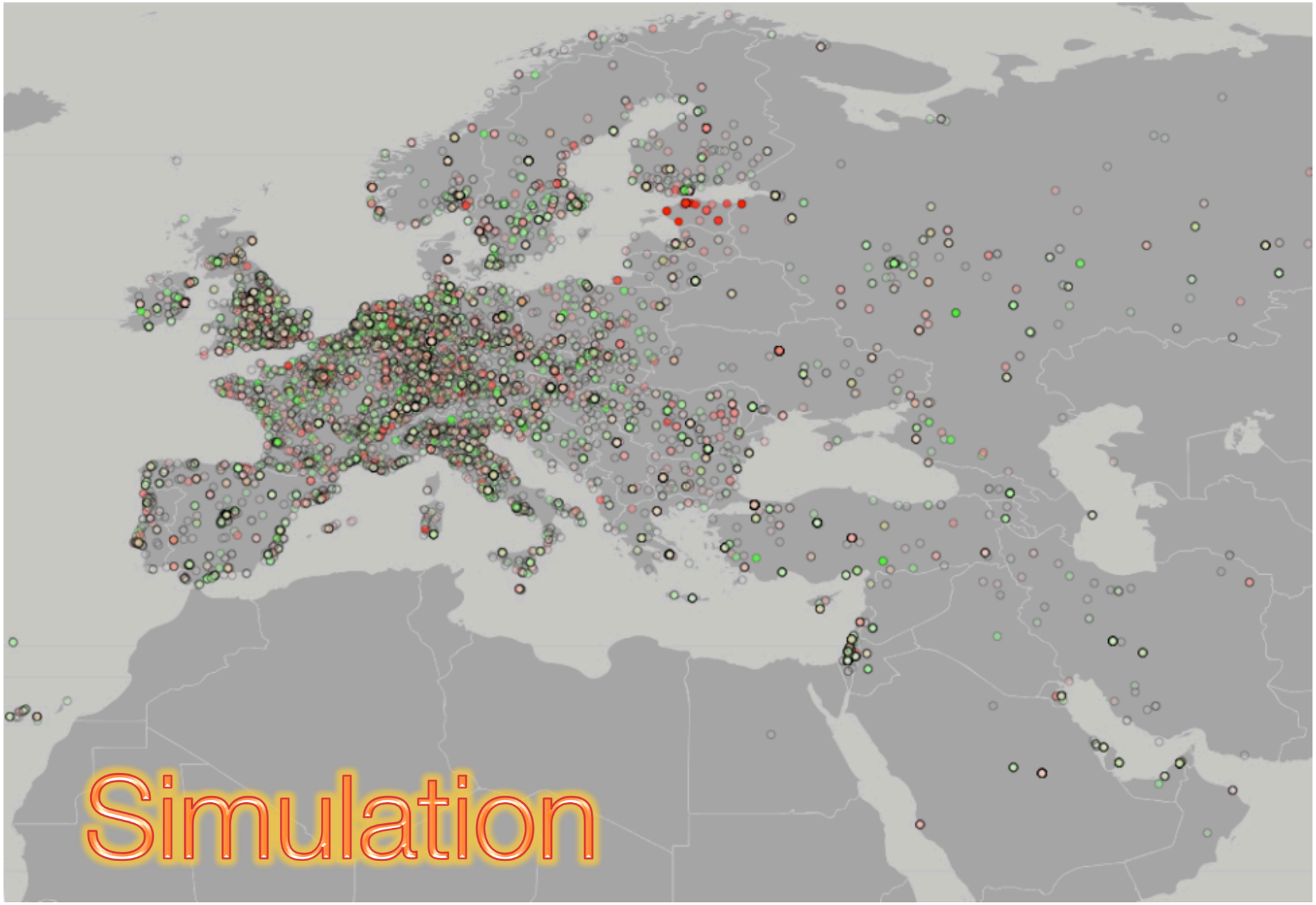
Intuition: 5000 Probes



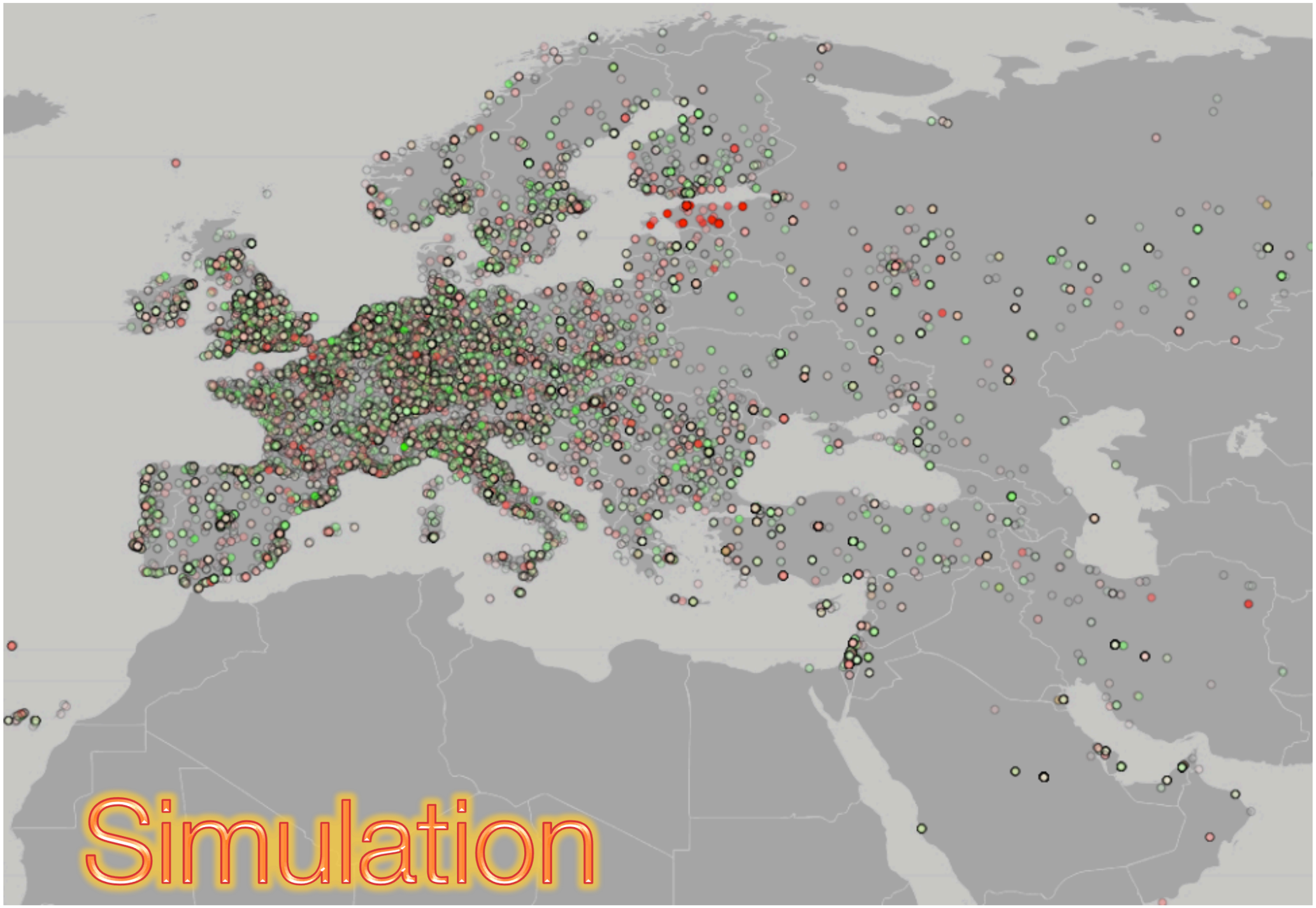
Intuition: 10k Probes



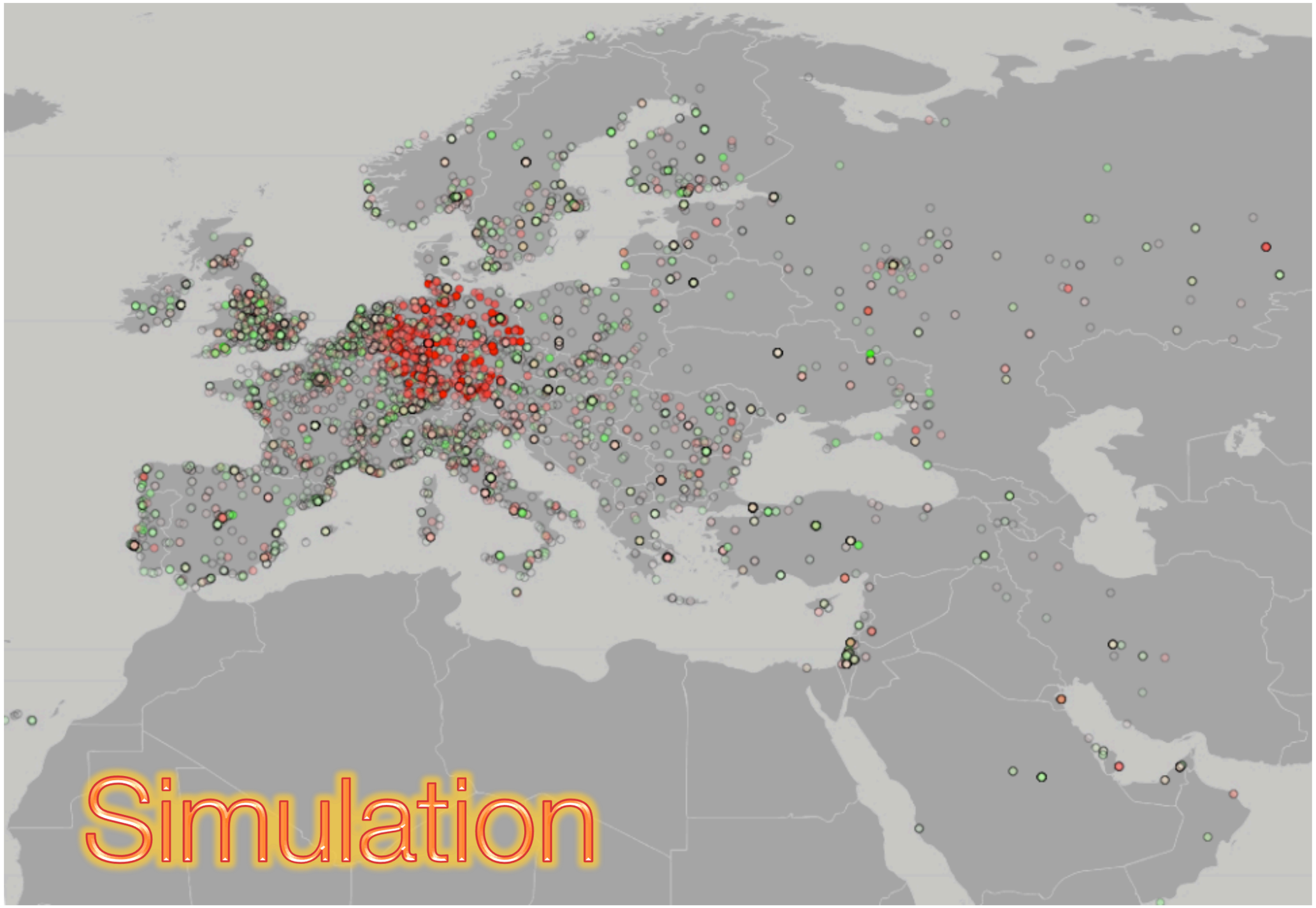
Intuition: 20k Probes



Intuition: 50k Probes



Intuition: 10k Probes & 1 AS



Ambitious Community Effort

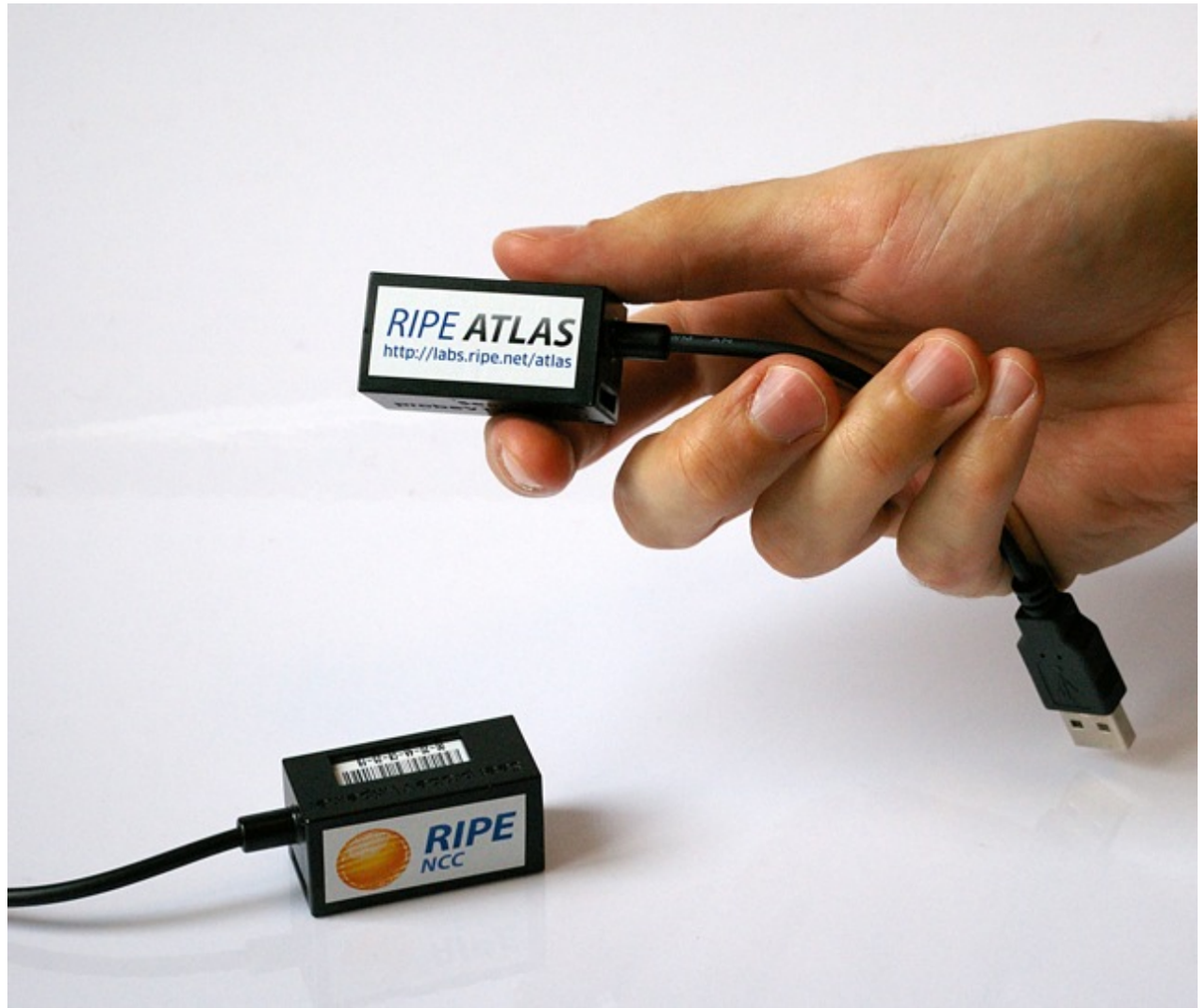
Instead of building small, separate, individual & private infrastructures, build a huge common infrastructure that serves ***both*** the private goals ***and*** the community goals.

Ambitious Community Effort

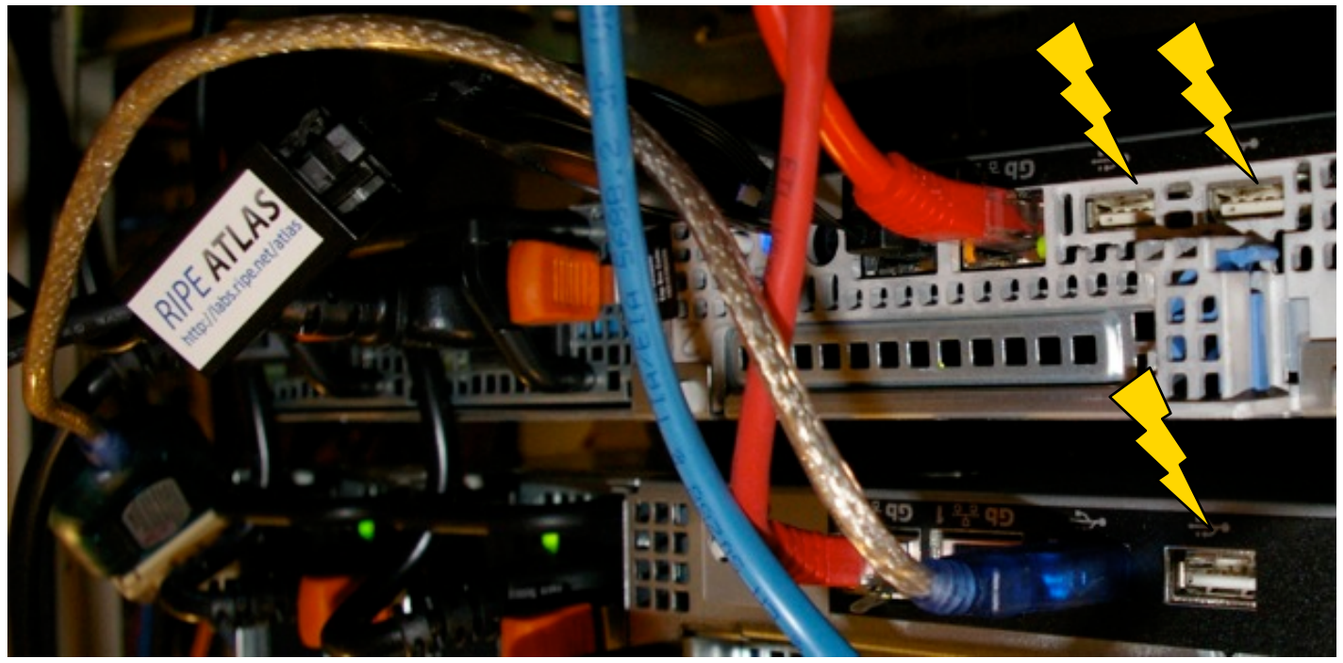
- Individual Benefits
  - Less expensive than rolling your own
  - More vantage points available
  - More data available
- Community Benefits
  - Unprecedented situational awareness
  - Wealth of data, …

Intuition -> Plan

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



Probe Deployments



Versions

- Version 0
  - Ping to fixed targets (IPv4 & IPv6) ✔
  - Traceroute to 1st two upstream hops ✔
- Version 1
  - Ping & Traceroute to variable targets
  - DNS queries to variable targets
- Version 2
  - Your ideas ?
- A non-goal: performance measurements

Network extent – deployed probes

NOT a Simulation

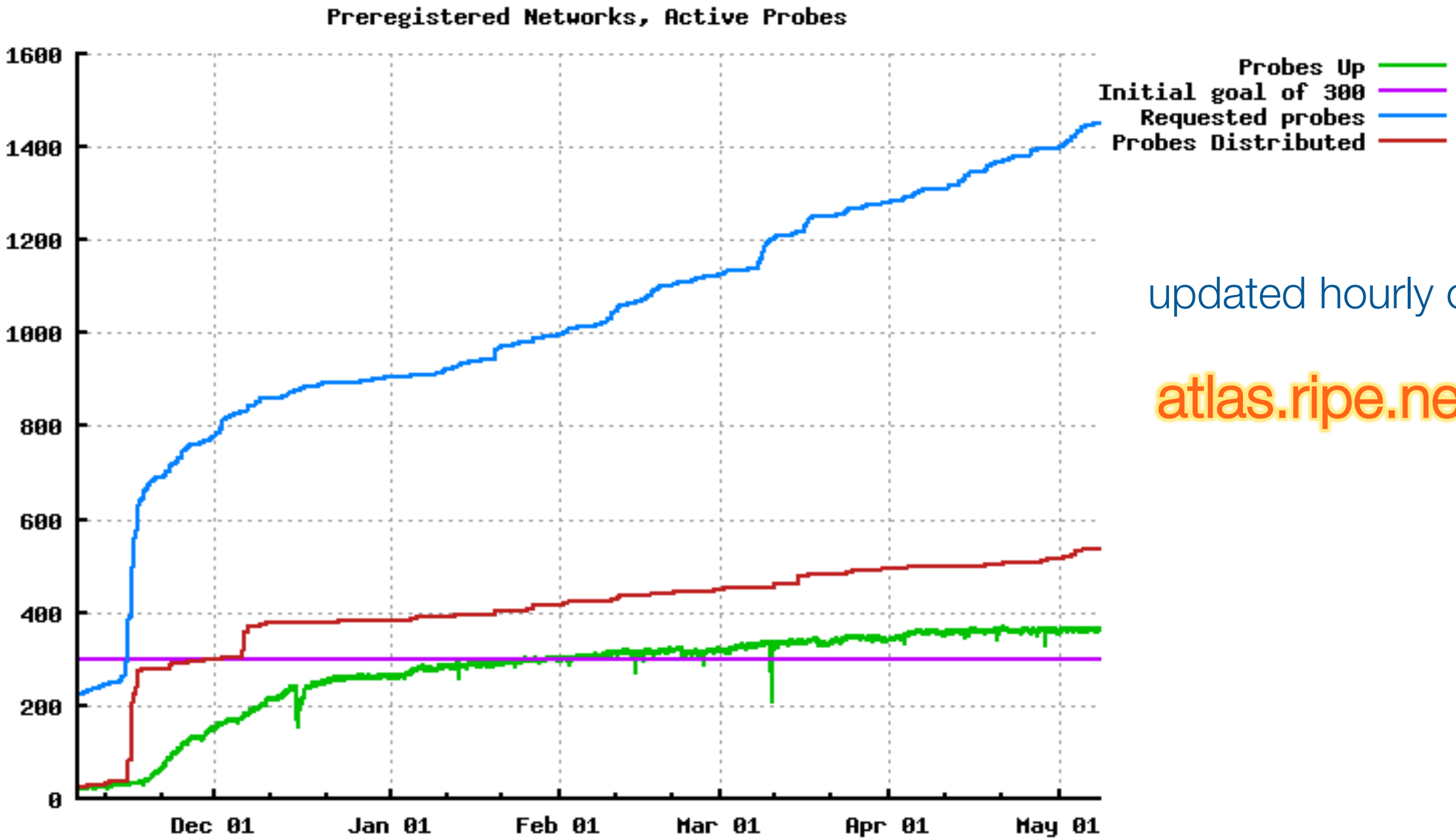
Network extent – deployed probes

NOT a Simulation

Network extent – hosts

NOT a Simulation

Network extent



updated hourly on

atlas.ripe.net

NOT a Simulation

Hosting = Credits = Measurements

- We cannot be everywhere without your help

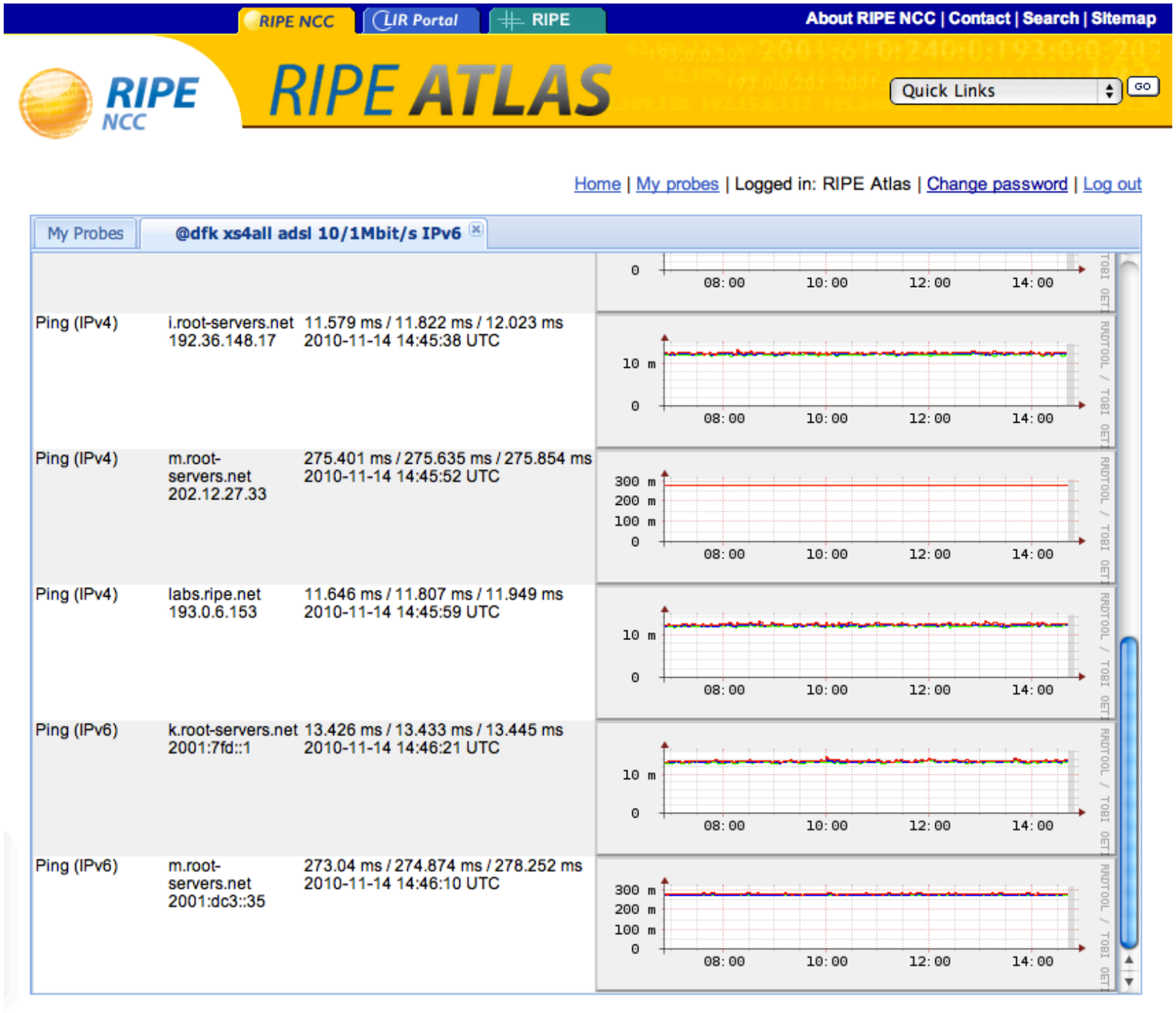
Become a probe host!

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

You get:

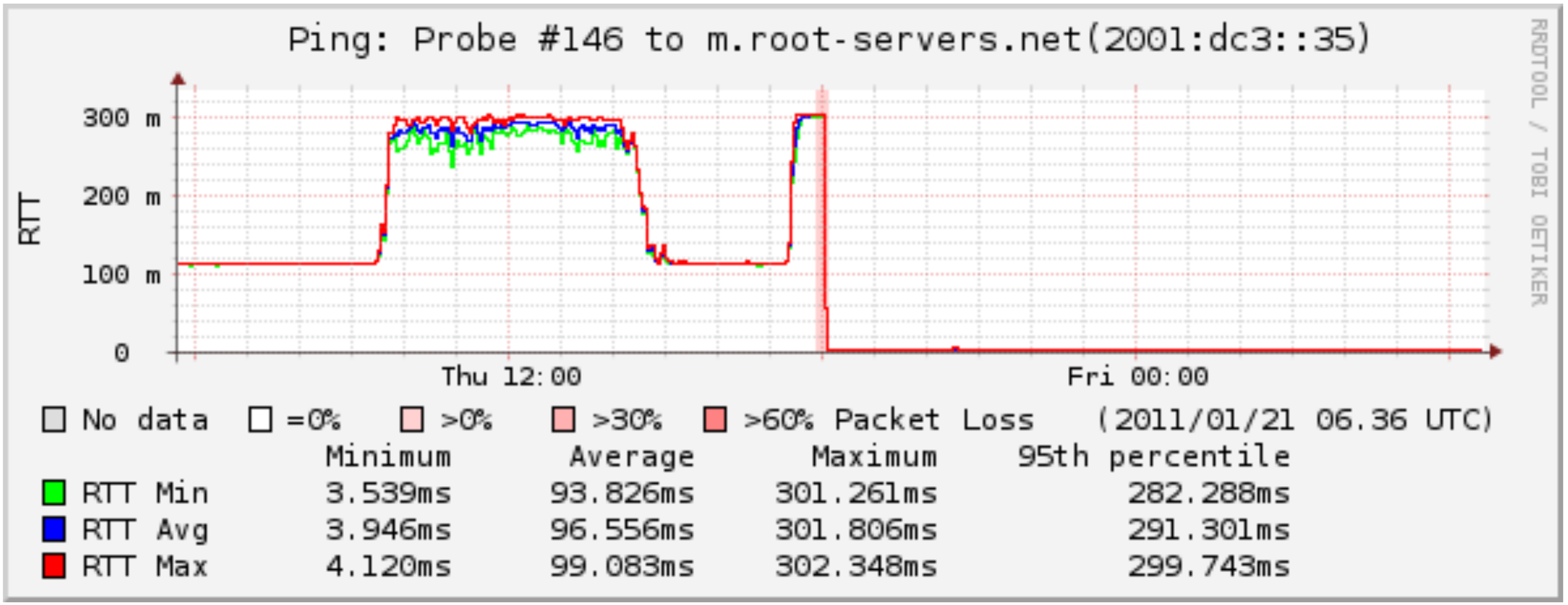
- Recognition
- Access to fixed measurements from your probe
- Credits = Measurements from any probe (Q2/11)

What you see is what you get



NOT a Simulation

What you see is what you get



NOT a Simulation

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)

Sponsorship = Credits = Measurements

Credits – a “measurement ecosystem”?

- Hosting a probe or sponsoring will earn you credits
- Scheduling your own measurements will cost credits
  - Simpler measurements are cheaper
  - More complex or more frequent measurements cost more

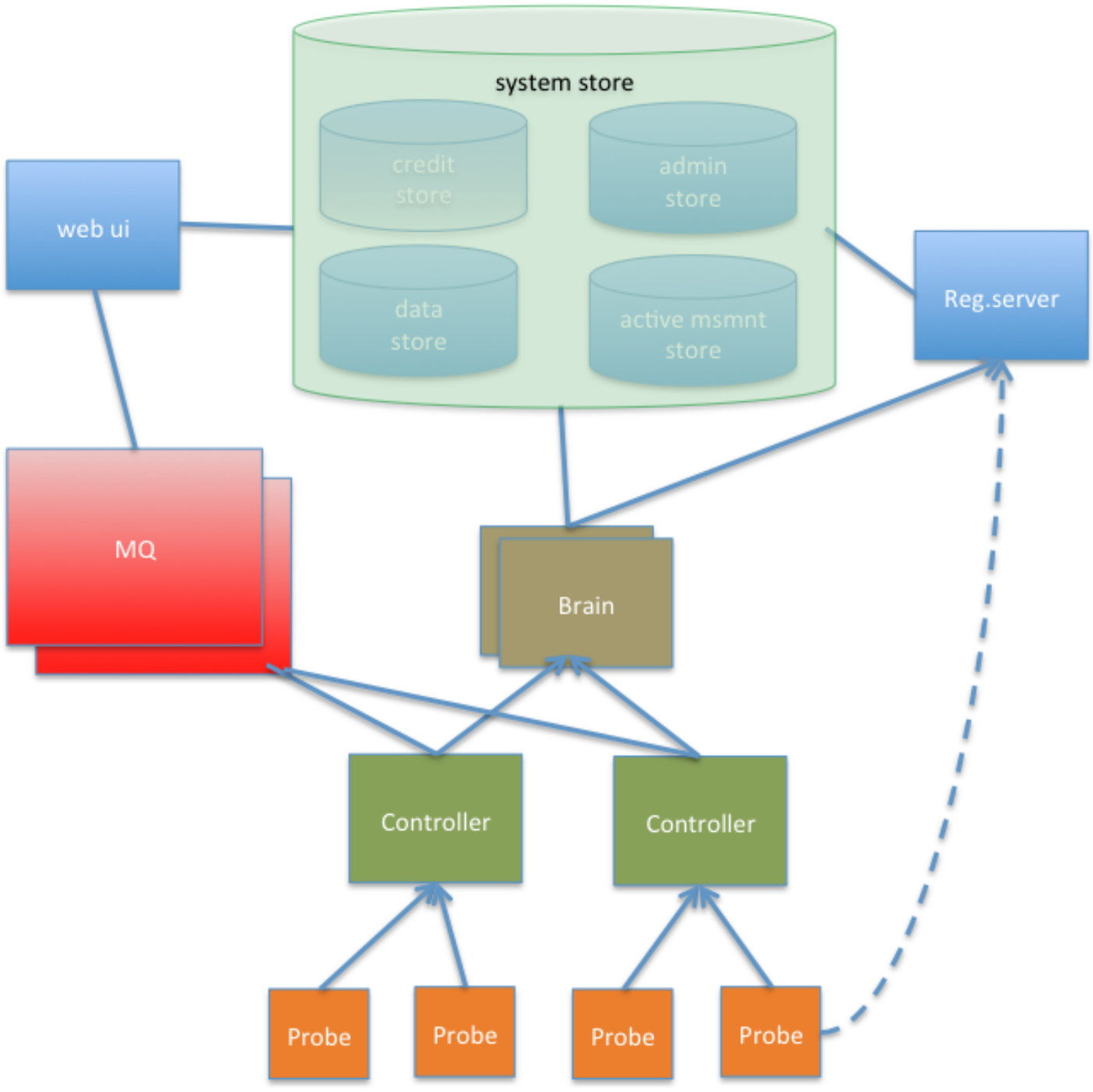
Sponsorship = Credits = Measurements

- Most of the early sponsors are more in for the idea than for the potential benefits (for now)
- Many of them are DNS providers of some kind
  - They have multiple locations and need to monitor these sites from multiple vantage points
  - It's useful to include eyeball networks in this
  - … and "renting" measurement functionality is simpler than building a complete measurement network yourself

Measurement nodes – “Probes”

- Probe (v1 / generation 1):
  - Lantronix XPortPro
  - Very low power usage
  - 8MB RAM, 16MB flash
  - Runs uClinux
  - No FPU, no MMU, virtually no UI
  - A reboot costs <15 (<5) seconds
  - An SSH connection costs ~30 seconds
  - We can remotely update the firmware
  - Form factor of the finished probe is “just right”

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

Questions?

atlas.ripe.net

RIPE NCC