Anycast census and geolocation

AIMS: Workshop on Active Internet Measurements

31 March - 2 April 2015

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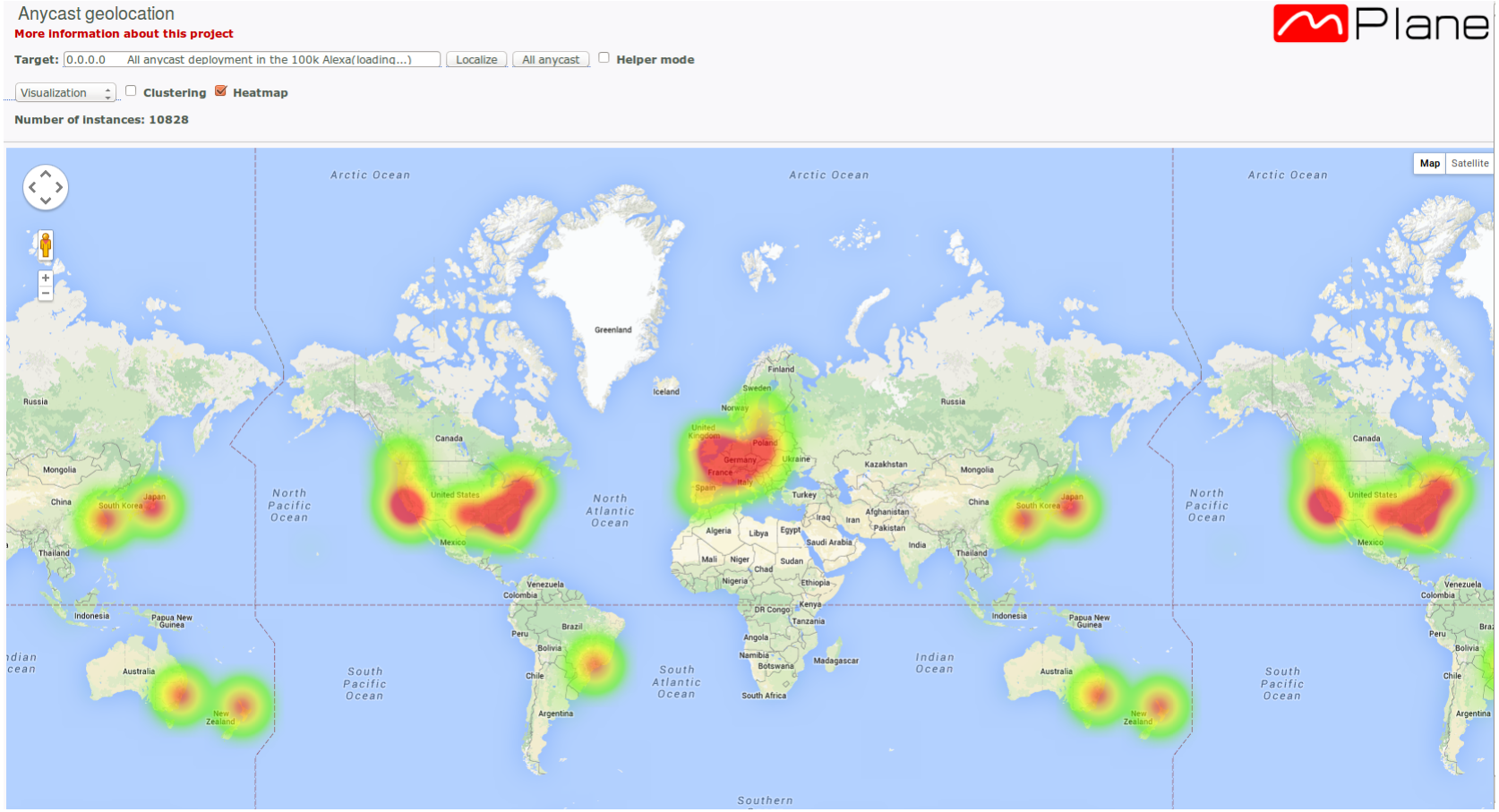
Jordan Auge
Diana Joumblatt
Dario Rossi
Timur Friedman

Here is where the anycast instances are

Demo: goo.gl/Ff8gdQ



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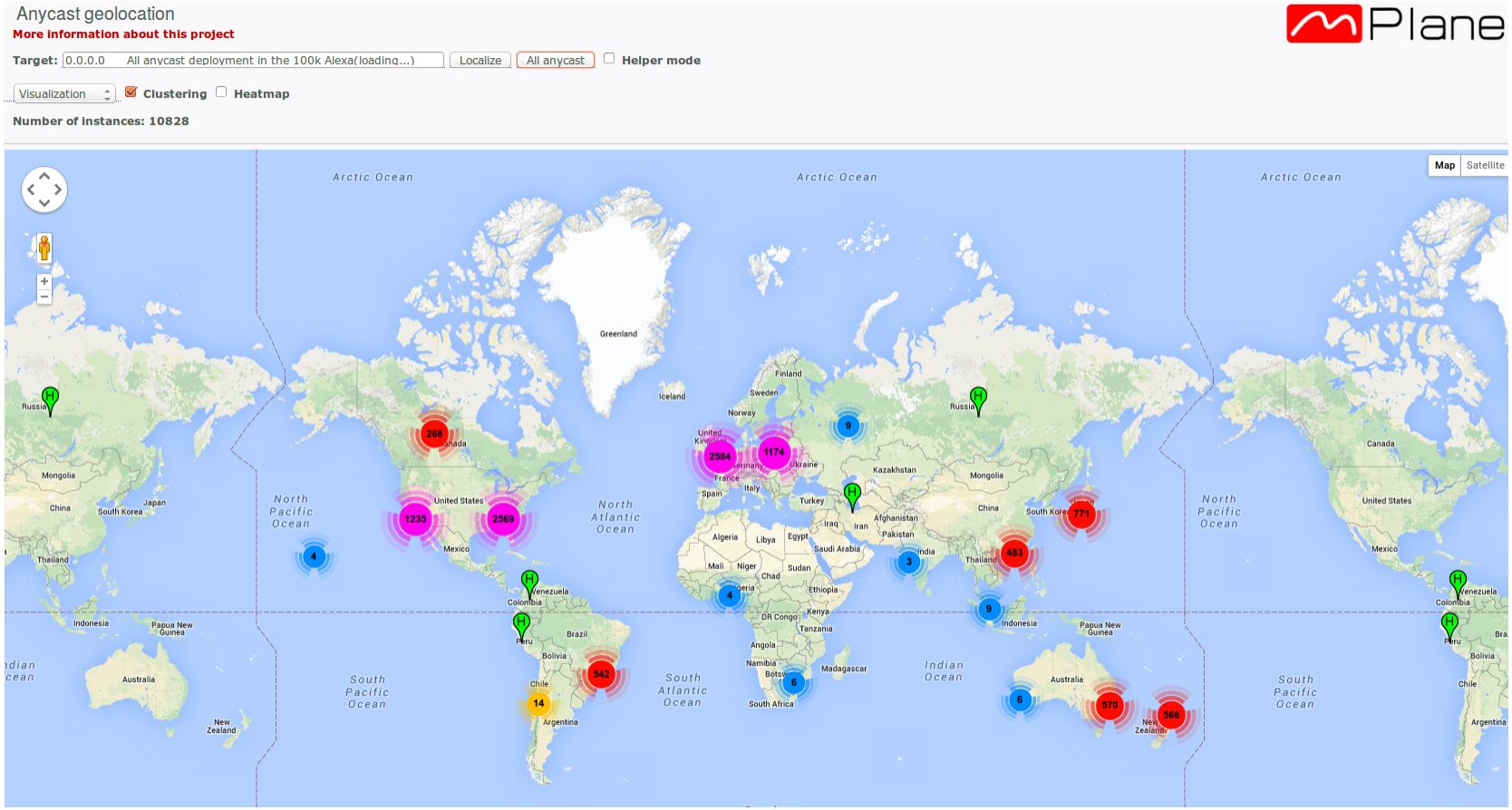

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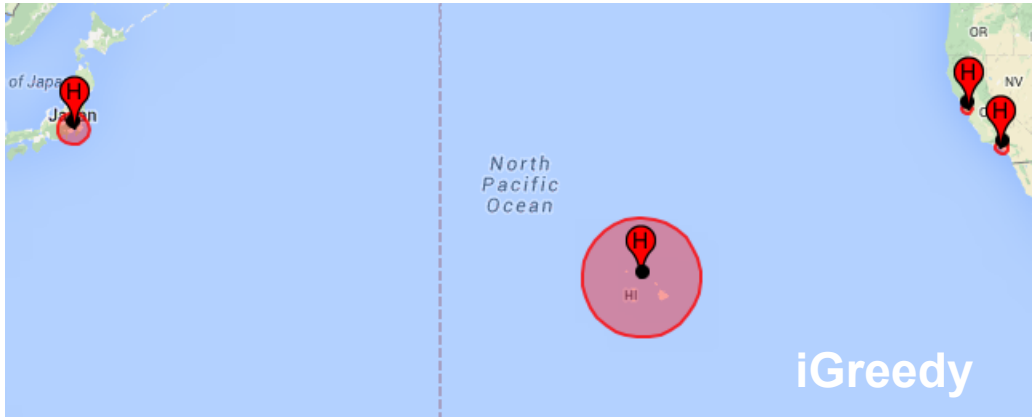
  - MaxMind: 1 instance



Country Code	Location	Postal Code	Coordinates	ISP
US	Redmond, Washington, United States, North America	98052	47.674, -122.1215	Microsoft Corporation

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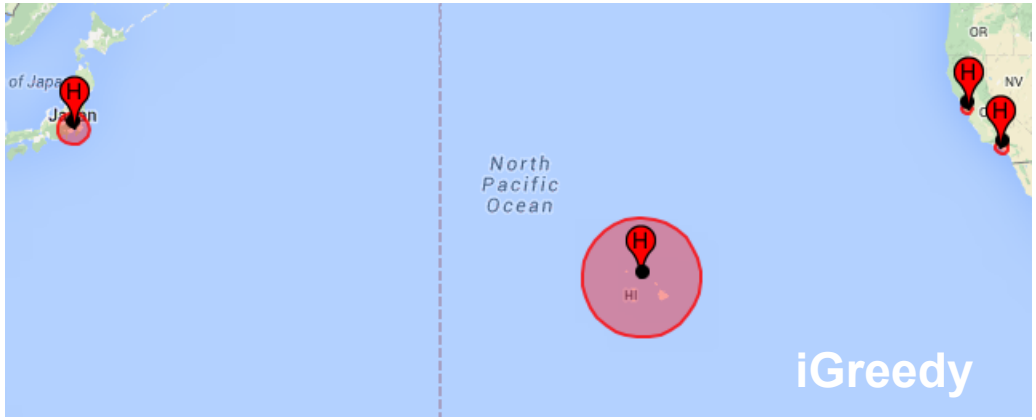

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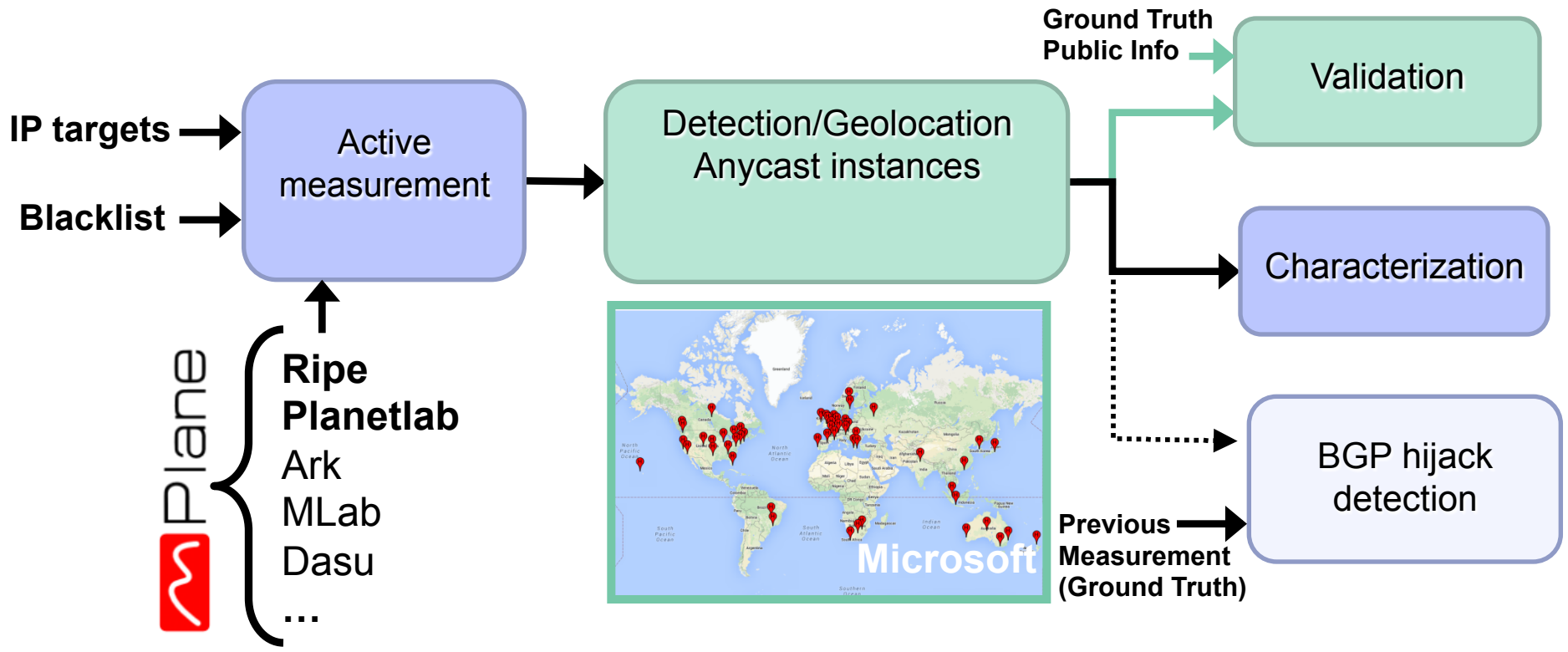
Who is using anycast?

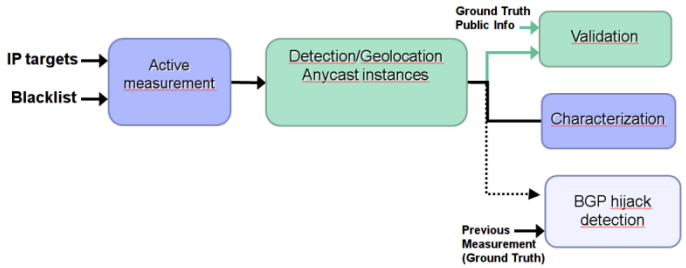
- DNS root server
- Google DNS
- Microsoft
- AT&T
- CDNs: cloudflare, edgecast

Workflow



[INFOCOM-15a] Cicalese, Danilo, Joumblatt, Diana , Rossi, Dario, Buob, Marc-Olivier , Auge, Jordan and Friedman, Timur ,
A Fistful of Pings: Accurate and Lightweight Anycast Enumeration and Geolocation . In IEEE INFOCOM, Hong Kong, China, Apr 2015.

Challenges



- Duration:

$$\frac{\#target * \#VantagePoints * \#sample/Vp}{\min(probing\ Rate)}$$

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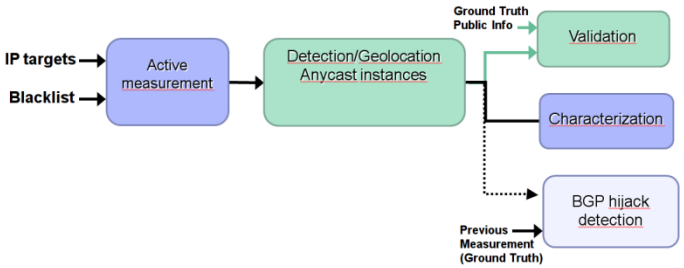

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- Recall

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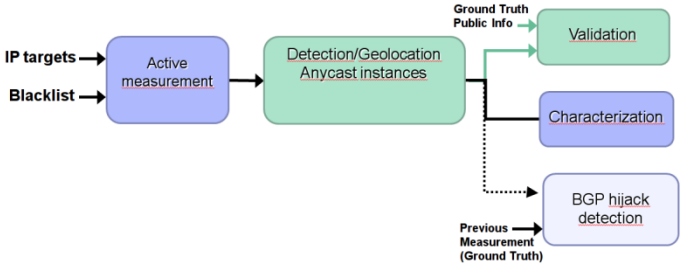

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- Recall
- Precision

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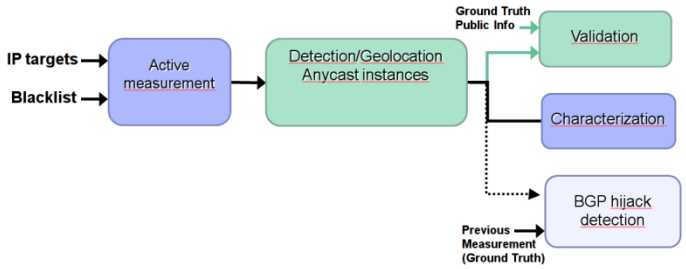

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- Recall
- Precision
- Scalability

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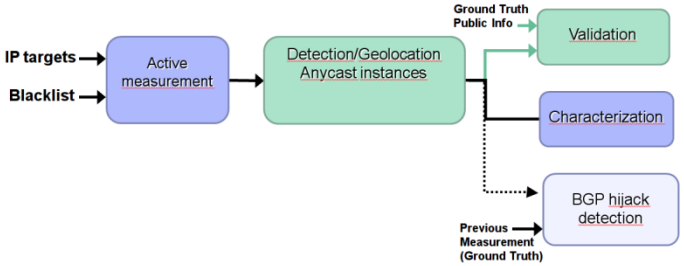

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- Intrusiveness $= \#sample/target\ in\ a\ small\ window$

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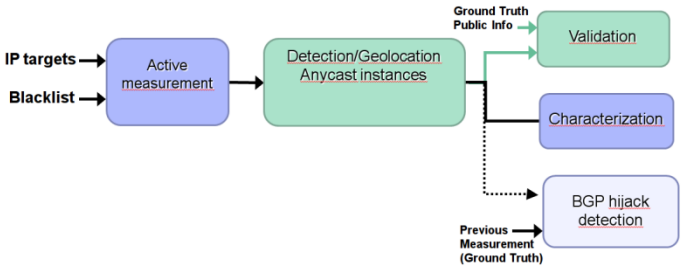


- Duration:

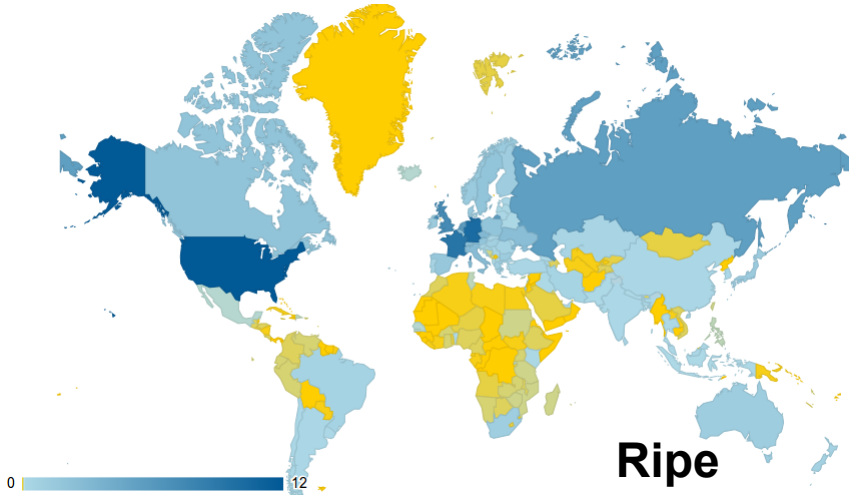
$$\frac{\#target * \#VantagePoints * \#sample/Vp}{\min(probing\ Rate)}$$

- Recall
- Precision
- Scalability
- Intrusiveness $= \#sample/target\ in\ a\ small\ window$
- Timeliness $= \frac{1}{Intrusiveness}$

Recall

$$\frac{\#target * \#VantagePoints * \#sample/Vp}{\min(probing\ Rate)}$$

- The number of vantage points Planetlab $O(10^2)$, Ripe $O(10^3)$
- How the vantage points are distributed



Recall

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- The number of vantage points
  Planetlab O(10^2), Ripe O(10^3)
- How the vantage points are distributed

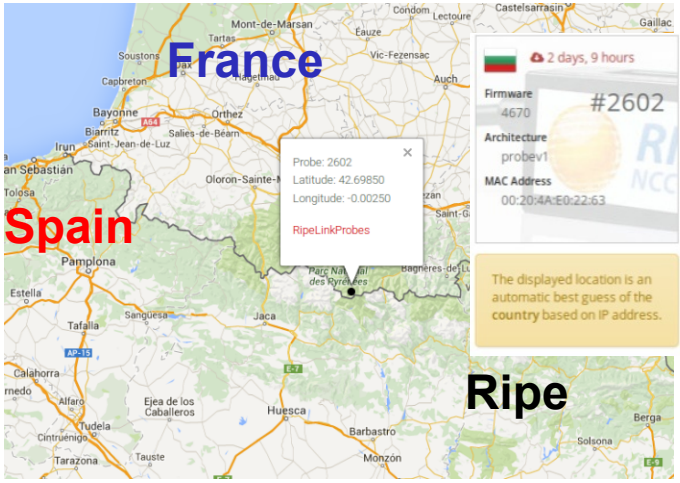
- Target: 199.27.134.71 CloudFlare
- Public information: 32 replicas

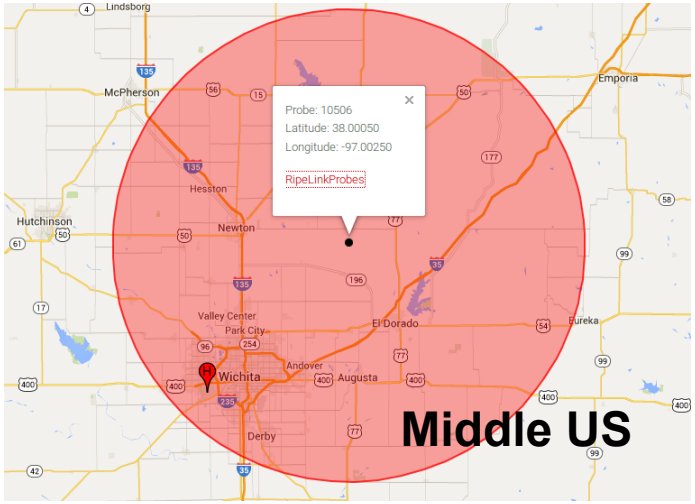
- **Planetlab**: 21 replicas
  - 245 Vantage points
  - 29 Country
  - 186 AS

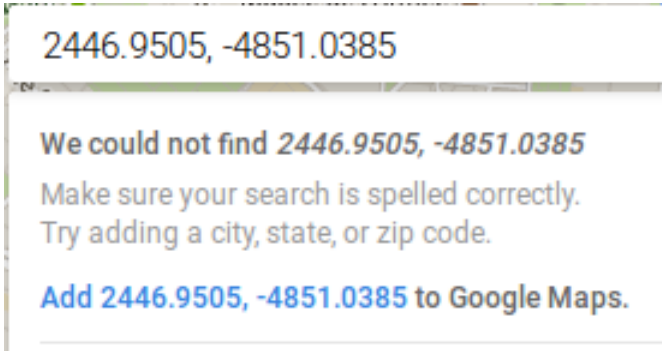
- **Ripe**: 47 replicas
  - 7289 Vantage points
  - 150 Country
  - 2122 AS

Precision

$$\frac{\#target \ * \ \#VantagePoints \ * \ \#sample/Vp}{\min(probing\ Rate)}$$

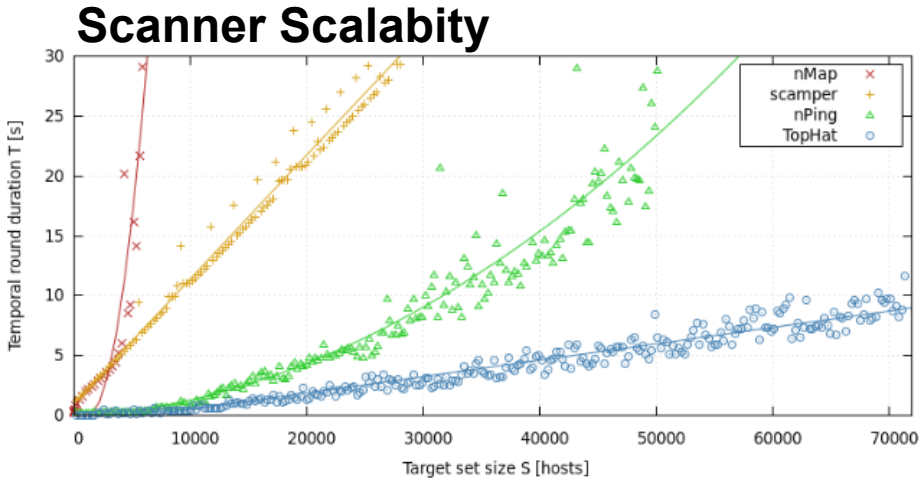






Scalability/Duration $\frac{\#target * \#VantagePoints * \#sample/Vp}{\min(probing\ Rate)}$

- Census:
  - 10 millions of targets
  - 1 sample/Vp
  - Probing Rate:1k sample per second
  - Duration: ~ 3 hours



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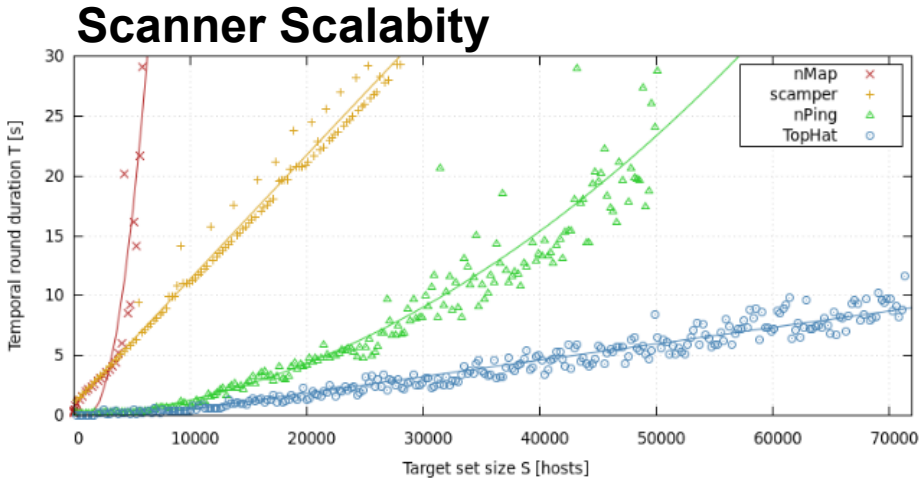

- FastPing:10k sample per second
- Census: ~ 18 min
- Lose on recall due the firewalls and filtering

How ark can help us

- PlanetLab
  - ✖ 300 vantage points(VPs)
  - ✖ Limited geographical coverage
  - ~ Accuracy of geolocation
  - ~ Availability issues
  - ✔ Very flexible
  - ✔ Very fast
- What we need:
  - Accurate geolocation of the VP
  - Increase the VP diversity
  - Exploit the complementary of the platform

- RIPE
  - ✔ 6000 vantage points(VPs)
  - ~ More constrained(ICMP, traceroute)
  - ✔ Clean API
  - ✖ Inherently non scalable