Anycast census and geolocation

AIMS: Workshop on Active Internet Measurements
31 March - 2 April 2015

Cicalese Danilo
Jordan Auge
Diana Joumblatt
Dario Rossi
Timur Friedman
Here is where the anycast instances are

Demo: goo.gl/Ff8gdQ
Here is where the anycast instances are

Demo: goo.gl/Ff8gdQ
Motivation

- Unicast geolocation techniques fail with anycast IPs!
Unicast geolocation techniques fail with anycast IPs!

- Microsoft: 204.79.197.215
  - iGreedy: 54 instances
  - MaxMind: 1 instance
Unicast geolocation techniques fail with anycast IPs!

Microsoft: 204.79.197.215
- iGreedy: 54 instances
- MaxMind: 1 instance

Who is using anycast?
- DNS root server
- Google DNS
- Microsoft
- AT&T
- CDNs: cloudflare, edgecast
Challenges

- Duration:

\[
\#\text{target} \times \#\text{VantagePoints} \times \#\text{sample}/Vp \\
\min(\text{probing Rate})
\]
Challenges

- **Duration:**
  
  \[
  \#\text{target} \times \#\text{VantagePoints} \times \#\text{sample/Vp} \\
  \min(\text{probing Rate})
  \]

- **Recall**
Challenges

- Duration:
  \[
  \frac{\#\text{target} \times \#\text{VantagePoints} \times \#\text{sample/Vp}}{\min(\text{probing Rate})}
  \]

- Recall
- Precision
Challenges

- **Duration:**

  \[
  \text{Duration} = \frac{\#\text{target} \times \#\text{VantagePoints} \times \#\text{sample/Vp}}{\min(\text{probing Rate})}
  \]

- Recall
- Precision
- Scalability
Challenges

- Duration:
  \[
  \frac{\#target \times \#VantagePoints \times \#sample/Vp}{\min(\text{probing Rate})}
  \]

- Recall
- Precision
- Scalability
- **Intrusiveness** = \#sample/\#target in a small window
Challenges

- Duration:
  \[
  \frac{\text{#target} \times \text{#VantagePoints} \times \text{#sample/Vp}}{\min(\text{probing Rate})}
  \]

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

The number of vantage points
Planetlab $O(10^2)$, Ripe $O(10^3)$

How the vantage points are distributed
Recall

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

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

- 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

- **RIPE**
  - ✔ 6000 vantage points (VPs)
  - ❁ More constrained (ICMP, traceroute)
  - ✔ Clean API
  - ✗ Inherently non scalable

- **What we need:**
  - Accurate geolocation of the VP
  - Increase the VP diversity
  - Exploit the complementary of the platform