

# Satellite



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Some applications or host providers might find it handy to know about Cloudflare's IPs. This page is intended to be the definitive source of Cloudflare's current IP ranges. IPv4

### IPv4

- 103.21.244.0/22
- 103.22.200.0/22
- 103.31.4.0/22
- 104.16.0.0/12
- 108.162.192.0/18
- 131.0.72.0/22
- 141.101.64.0/18
- 162.158.0.0/15
- 172.64.0.0/13
- 173.245.48.0/20
- 188.114.96.0/20
- 190.93.240.0/20
- 197.234.240.0/22
- 198.41.128.0/17
- 199.27.128.0/21

Also available as a [IPv4 text list](#).

Contact our team

**1 (888) 99 FLARE**  
1 (888) 993 5273

**UK callers:**  
+44 (0)20 3514 6970

**Singapore callers:**  
+65 3158 3954

**International callers:**  
+1 (650) 319 8930

Under DDoS attack?

[Full feature list and plans types](#)

**On average, a website on Cloudflare:**

- Loads twice as fast
- Uses 60% less bandwidth
- Has 65% fewer requests

Harvard  
Toronto  
The SecDev Group



OpenNet Initiative

GLOBAL INTERNET FILTERING MAP

**select a map:**

- Political**
- Social**
- Conflict / Security**
- Internet Tools**

The ONI collects global data on Internet filtering using technical and contextual tools. Our analysis is based on a fusion of expert (qualitative) and statistical (quantitative) methods, and represents the current state of filtering drawn from ONI's on-going survey work. ONI testing is an ongoing and evolving process. We continue to refine our analytical toolset and document new methods and means by which information on the Internet is shaped and filtered. The categories embedded in our maps are provided as an aid to interpreting results, rather than an absolute measure of how countries filter.

**Regional Summaries:**

- asia
- australia / nz
- cis
- europa
- latin america
- middle east / n africa
- sub-saharan africa
- us / canada

NOTE: Gaza & the West Bank do not appear in the map's coding.

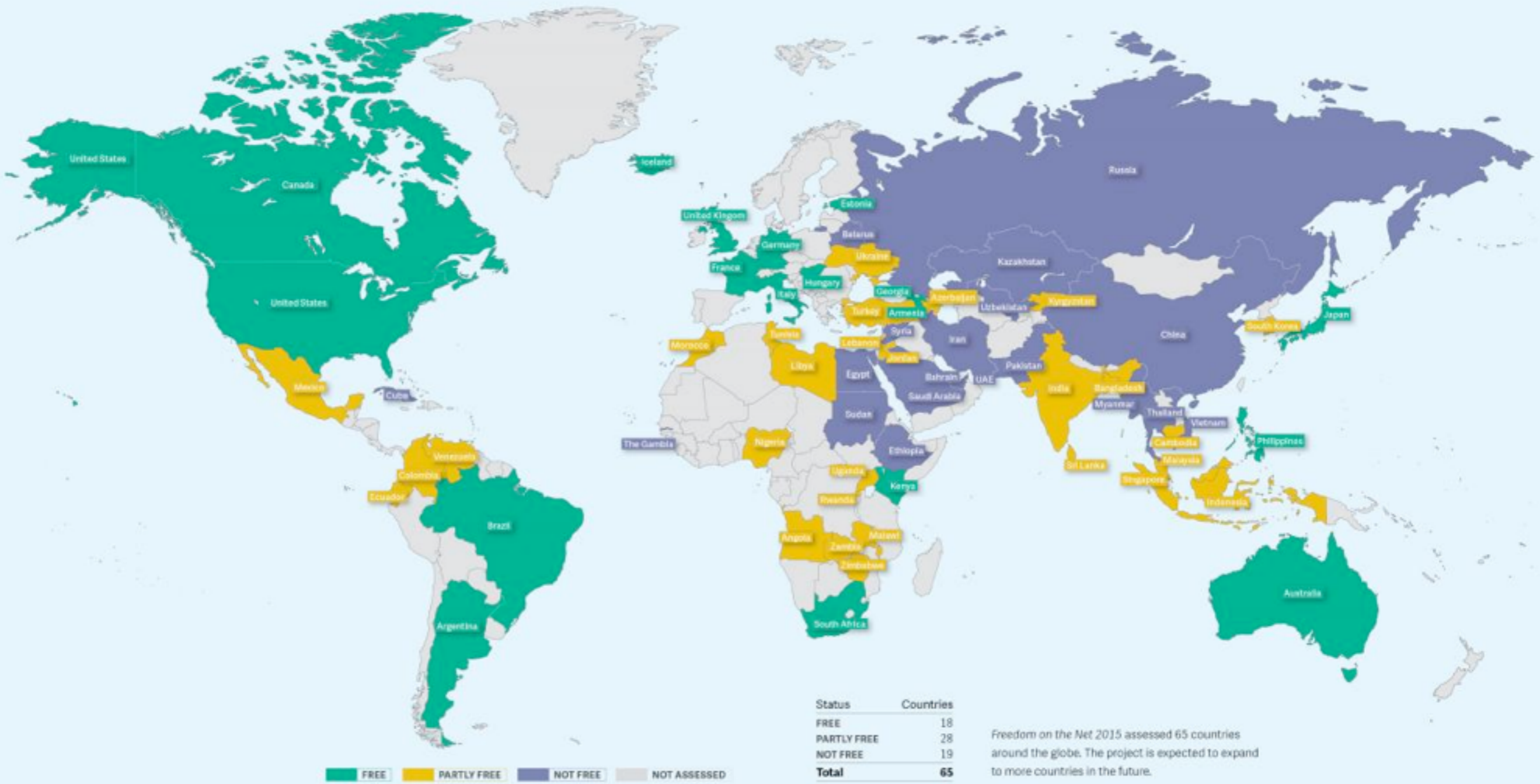
[click here for Gaza/West Bank summary](#)



Financial support for the OpenNet Initiative has come from the Ford Foundation, the Open Society Institute and the International Development Research Council. ONI is currently supported by a generous grant from the John D. and Catherine T. MacArthur Foundation.



# FREEDOM ON THE NET 2015



# twitter.com

Server	IP
8.8.8.8 (US)	199.59.149.198
77.88.8.8 (Russia)	199.16.156.102
180.76.76.6 (China)	159.106.121.75

# twitter.com

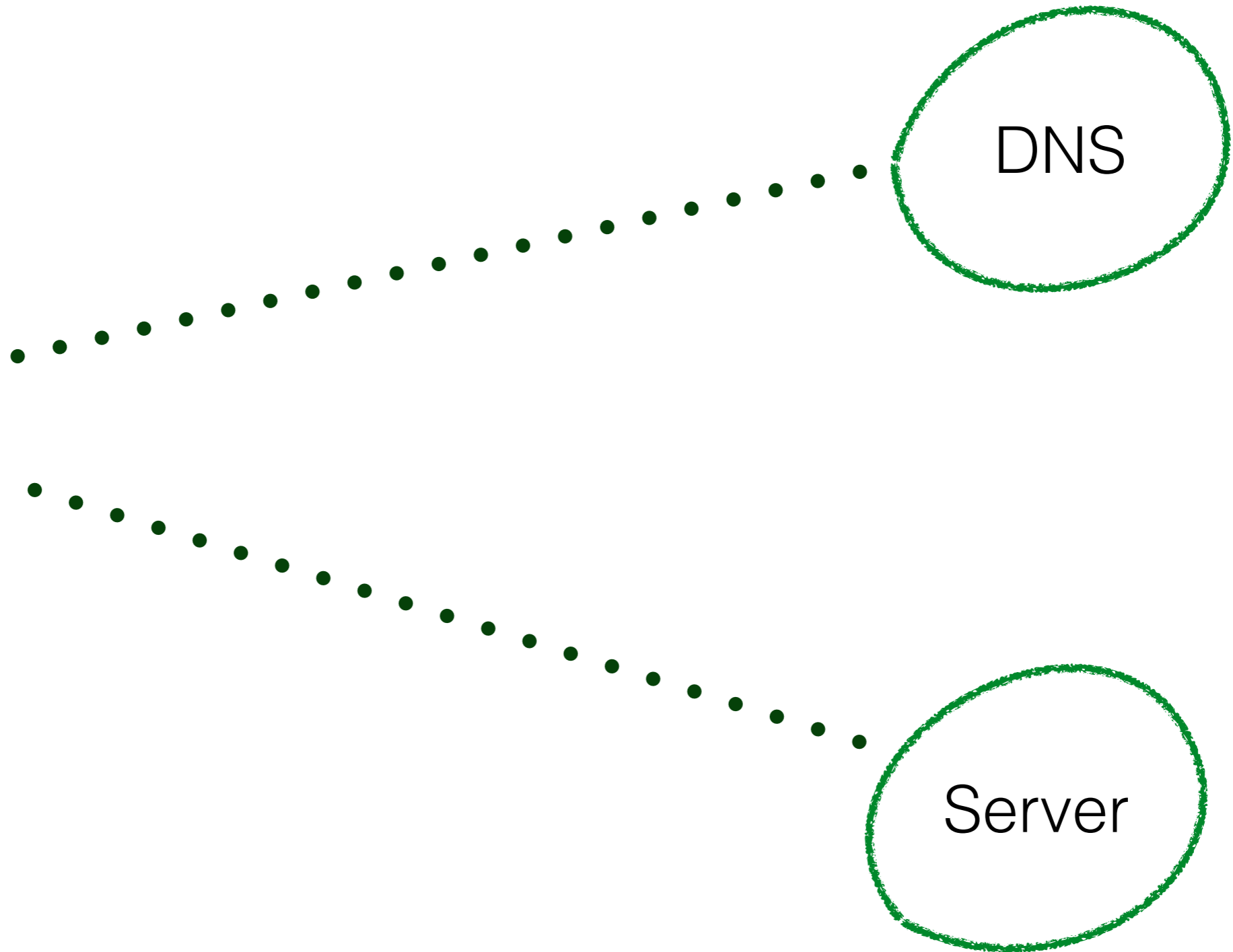
Server	IP	Result
8.8.8.8 (US)	199.59.149.198	Twitter
77.88.8.8 (Russia)	199.16.156.102	Twitter
180.76.76.6 (China)	159.106.121.75	Failure

# Structure

- How & Why of measurement
- Background
- Algorithmic Identification
- Measurement Collection System
- Determination of Censorship
- Results



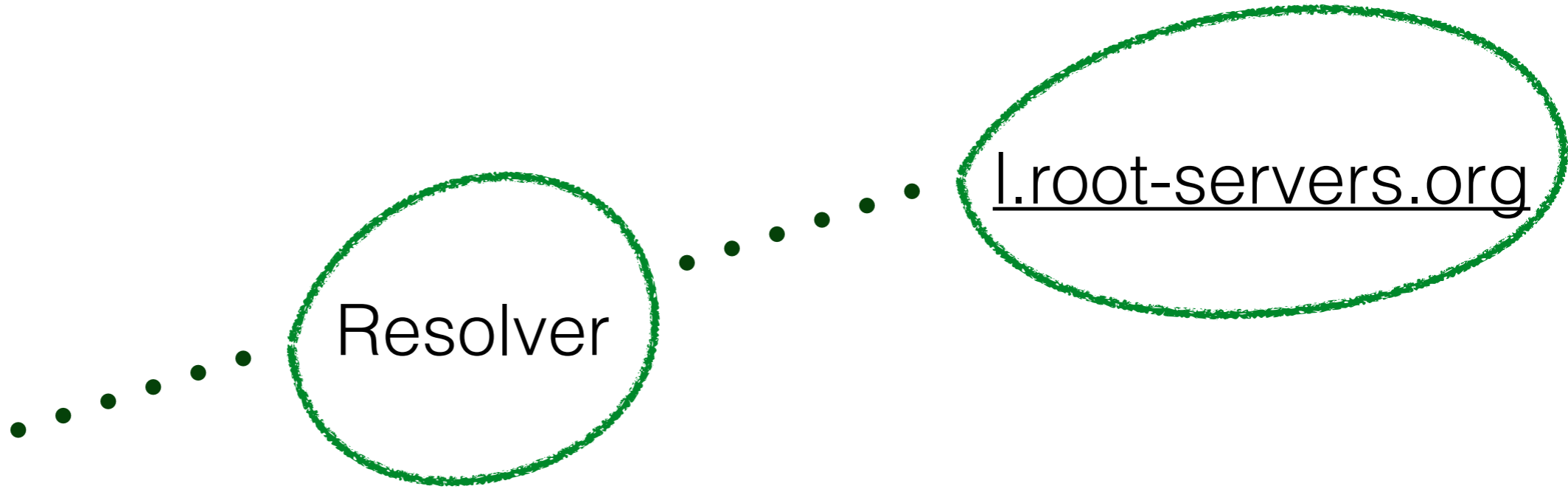
# DNS



# DNS

Resolver

l.root-servers.org



# DNS

Resolver

l.root-servers.org

dns1.nic.uk



# DNS

Resolver

l.root-servers.org

dns1.nic.uk

ns.bbc.co.uk



# DNS

Resolver

Server

ns.bbc.co.uk



# DNS

Resolver

Resolver

Server

Server

ns.bbc.co.uk



# DNS

Resolver

ns.bbc.co.uk



# DNS

Resolver

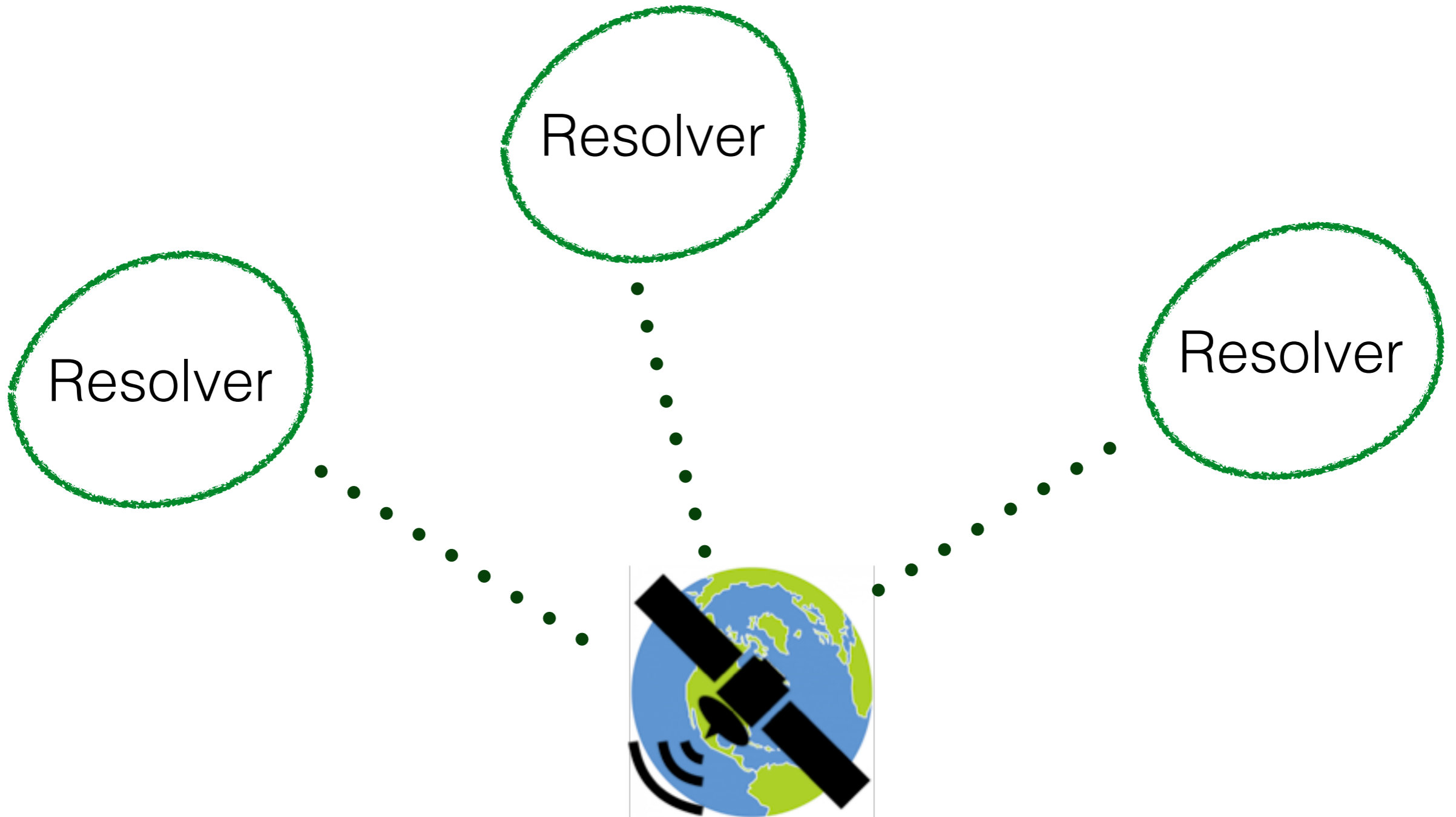
Block Page

ns.bbc.co.uk





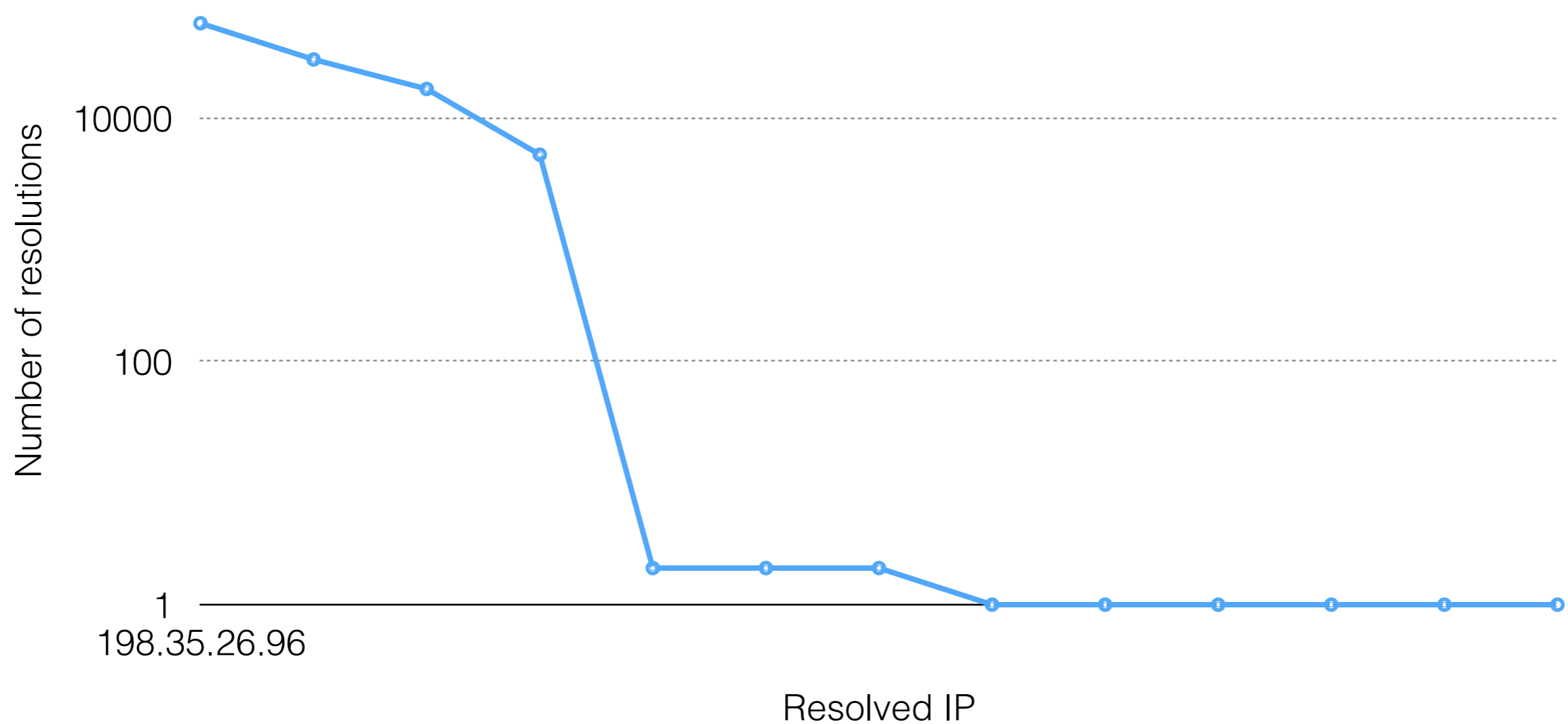
# DNS



# Scale

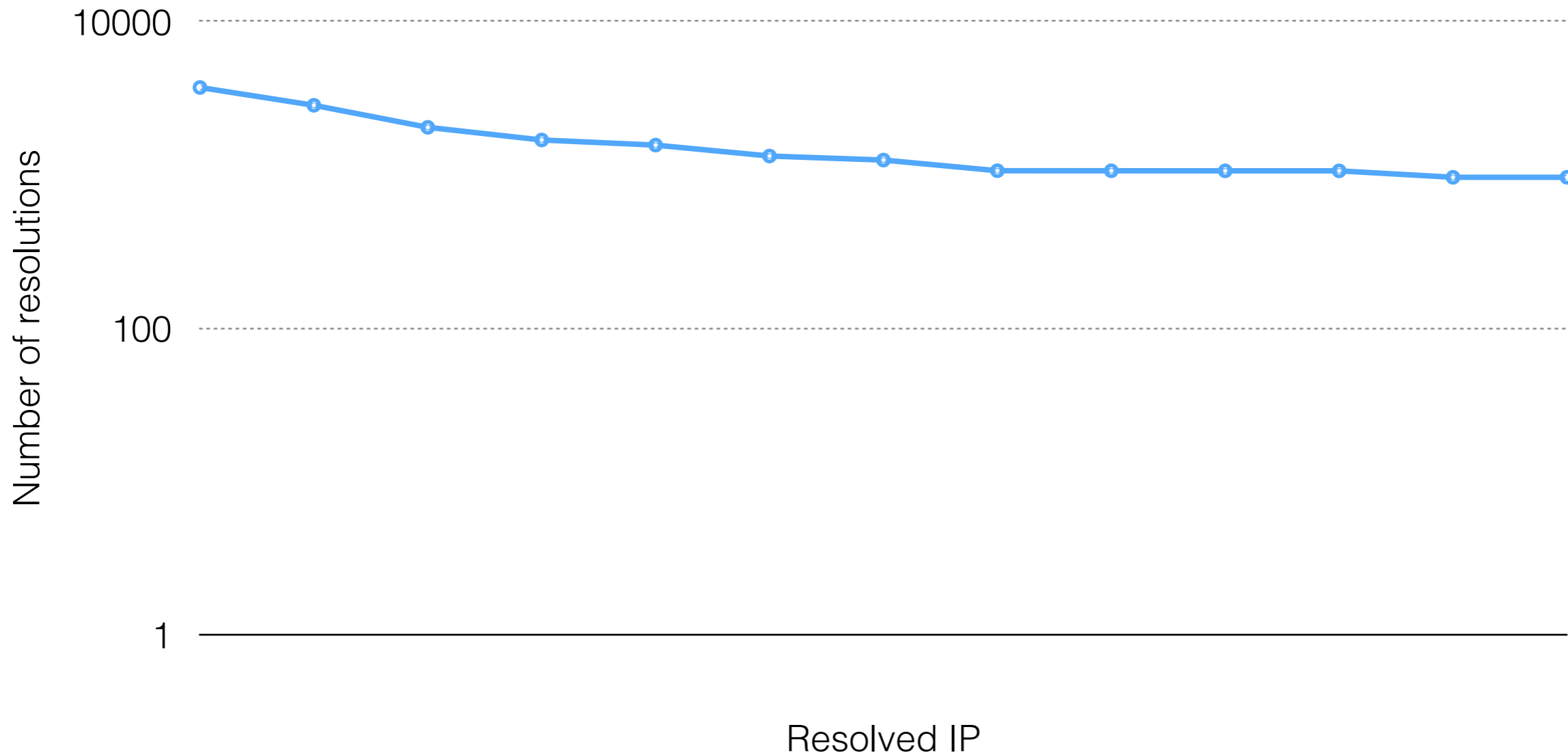
- Open Resolvers: 7,000,000
- Networks with  $>20$  resolvers:  $\sim 20,000$
- Countries with  $>20$  resolvers:  $\sim 170$
- Scan frequency: weekly

# Wikipedia DNS Resolutions



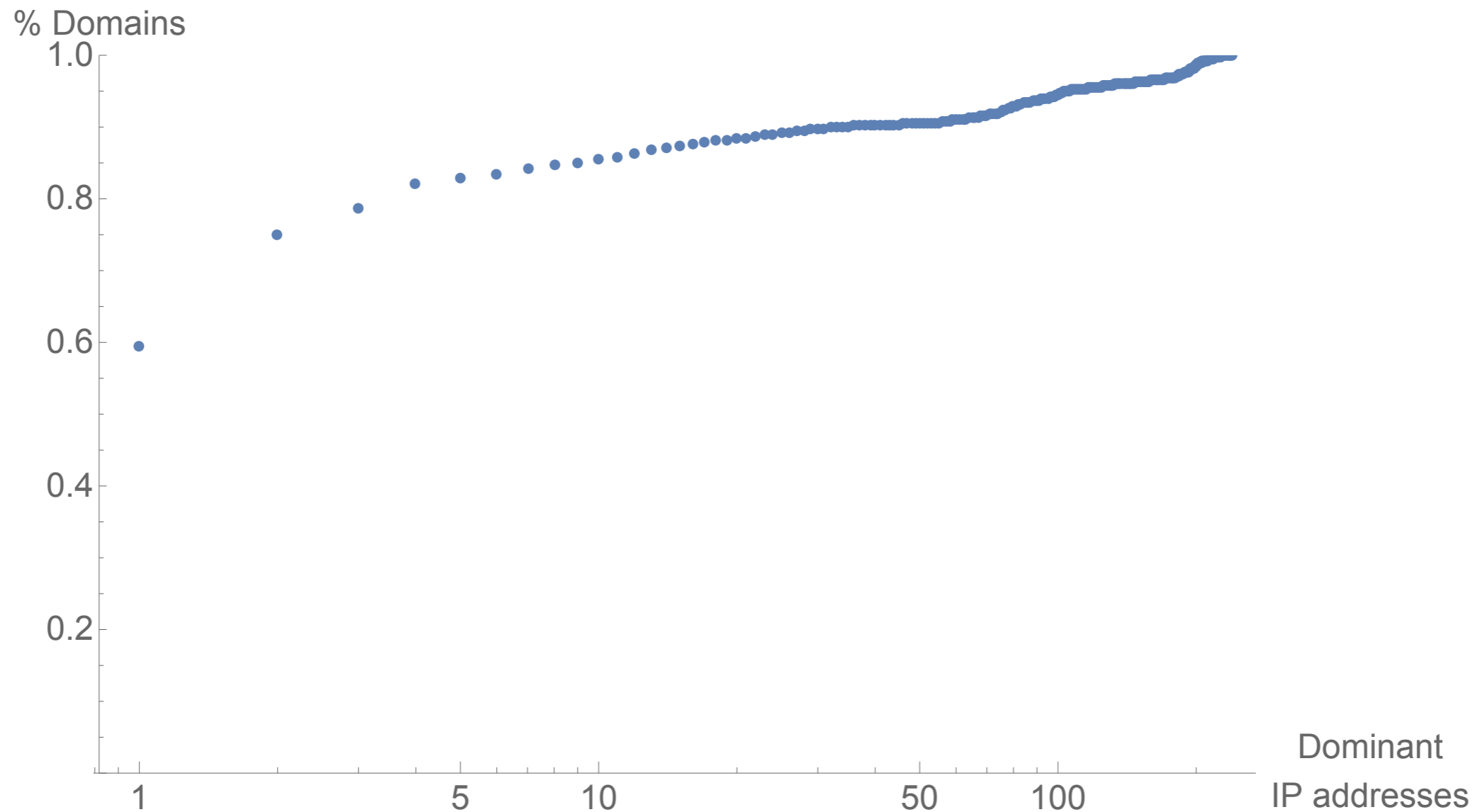
Wikipedia has four IP addresses that are returned everywhere

# Google DNS Resolutions



Google does not have a single set of 'correct' IP addresses

# Overall DNS Resolutions



20% of domains do not have a small number of dominant IPs

# Divergence

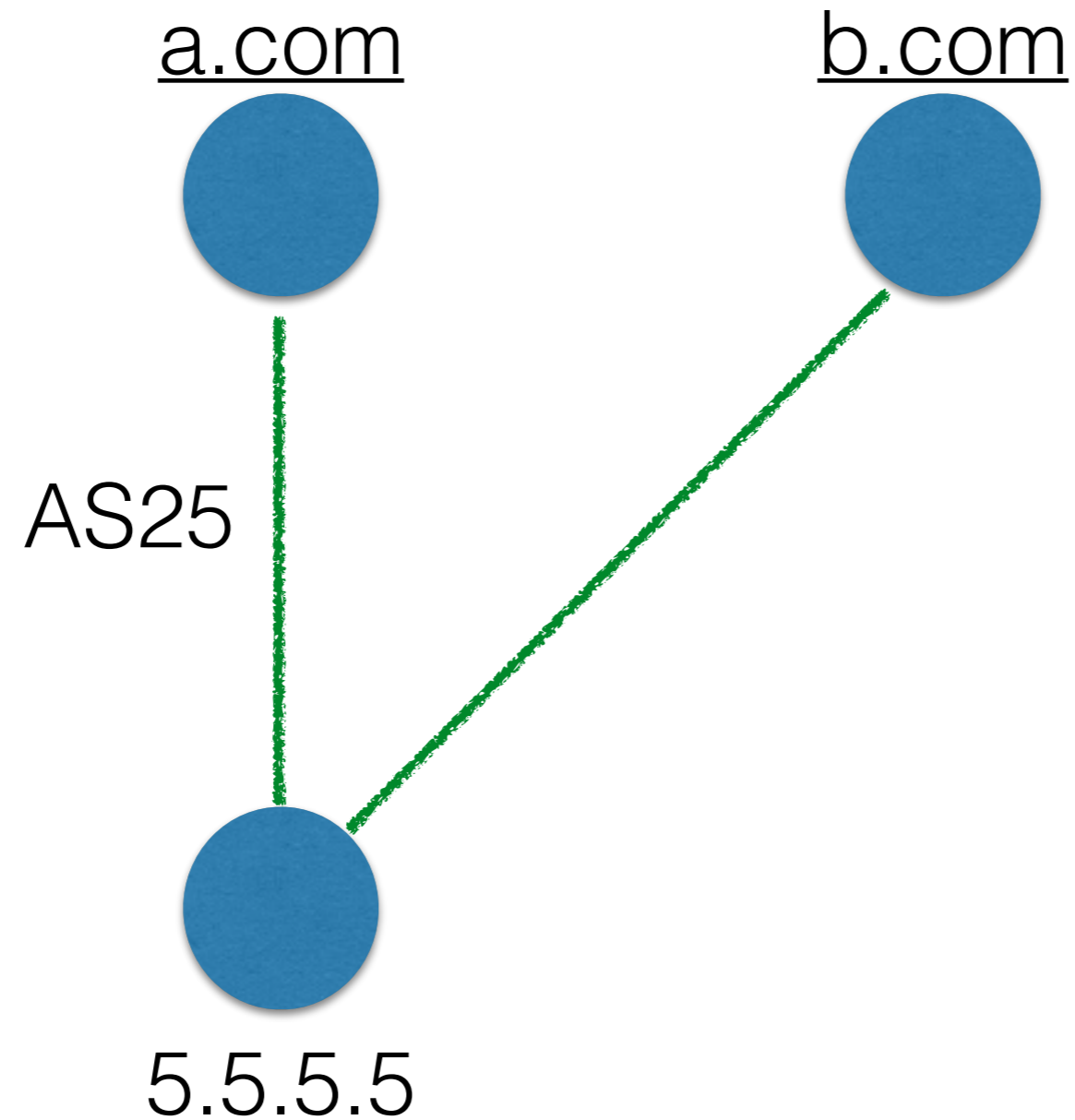
	<u>imgur.com</u>	<u>scribd.com</u>
<b>AS 2856</b> <b>British Telecom</b>	185.31.19.193: 130 185.31.18.193: 49	185.31.19.175: 183 185.31.18.175: 173
<b>AS 12880</b> <b>ITC</b>	199.27.73.193: 123 23.235.47.193: 50 199.27.79.193: 48	10.10.34.36: 214 185.31.17.175: 31

Censorship causes divergence from expected CDN responses

# Structure

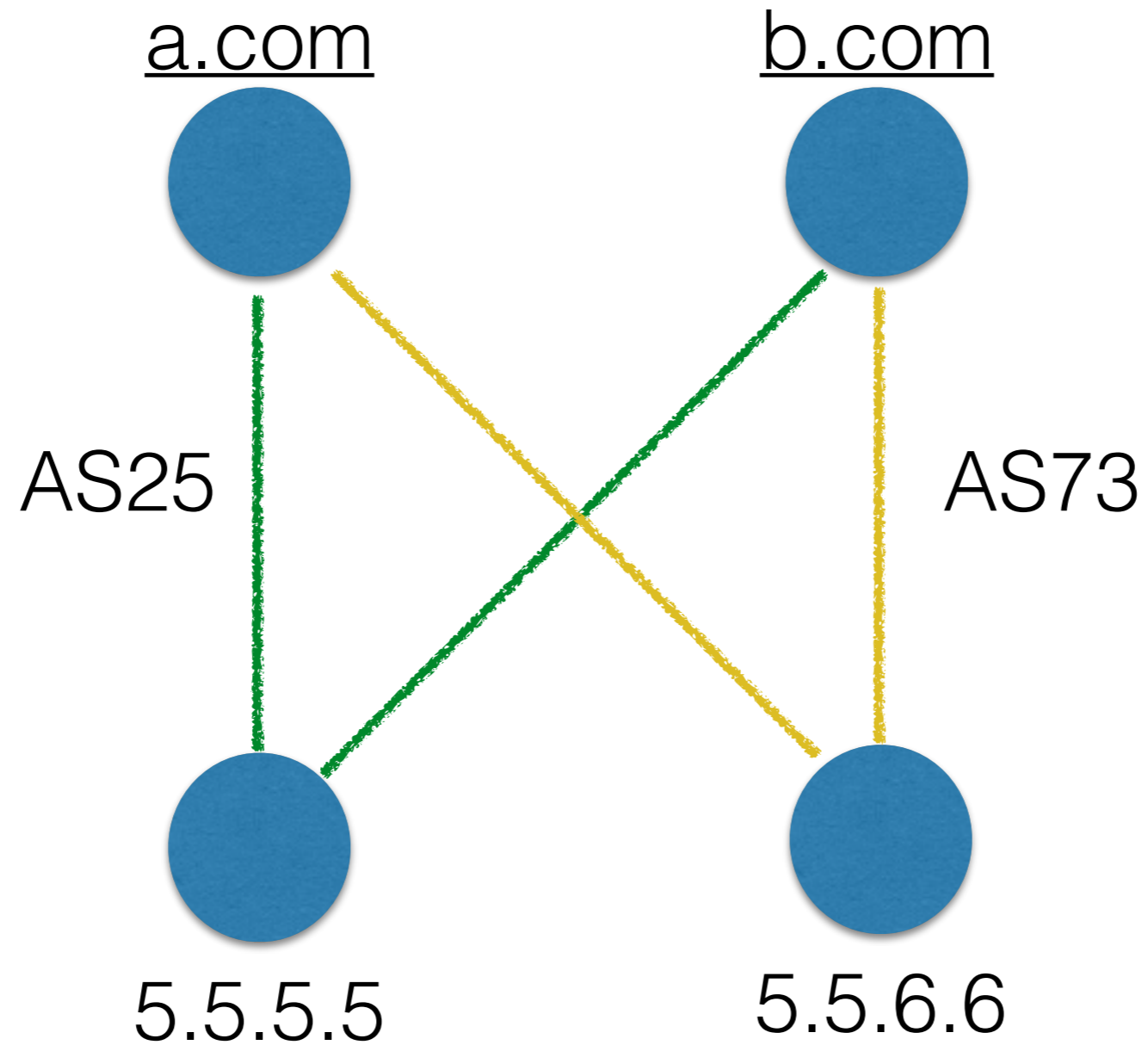
- How & Why of measurement
- Background
- **Algorithmic Identification**
- Measurement Collection System
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- Results

# Domain Similarity

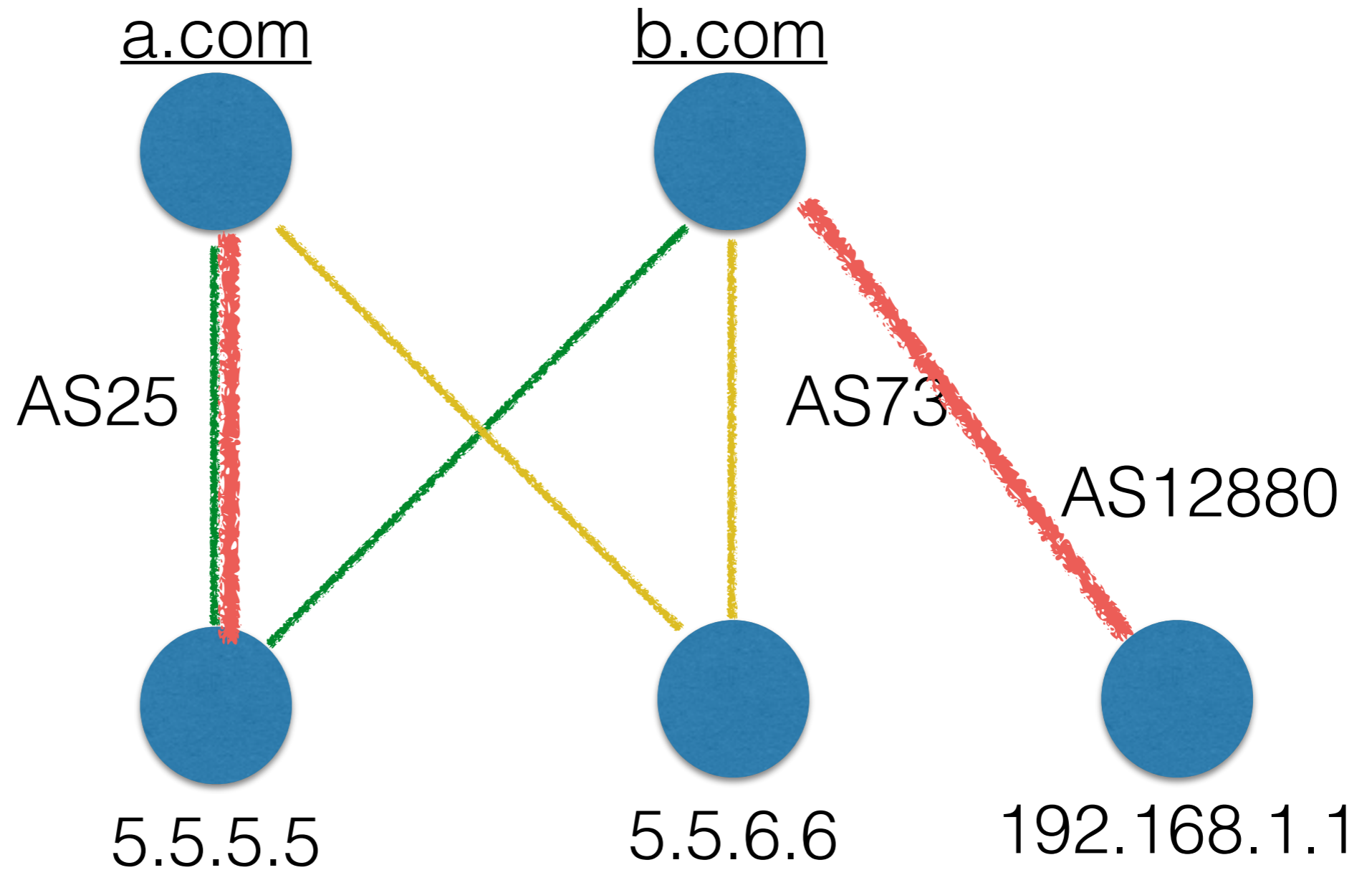




# Domain Similarity



# Domain Similarity



# Domain Similarity

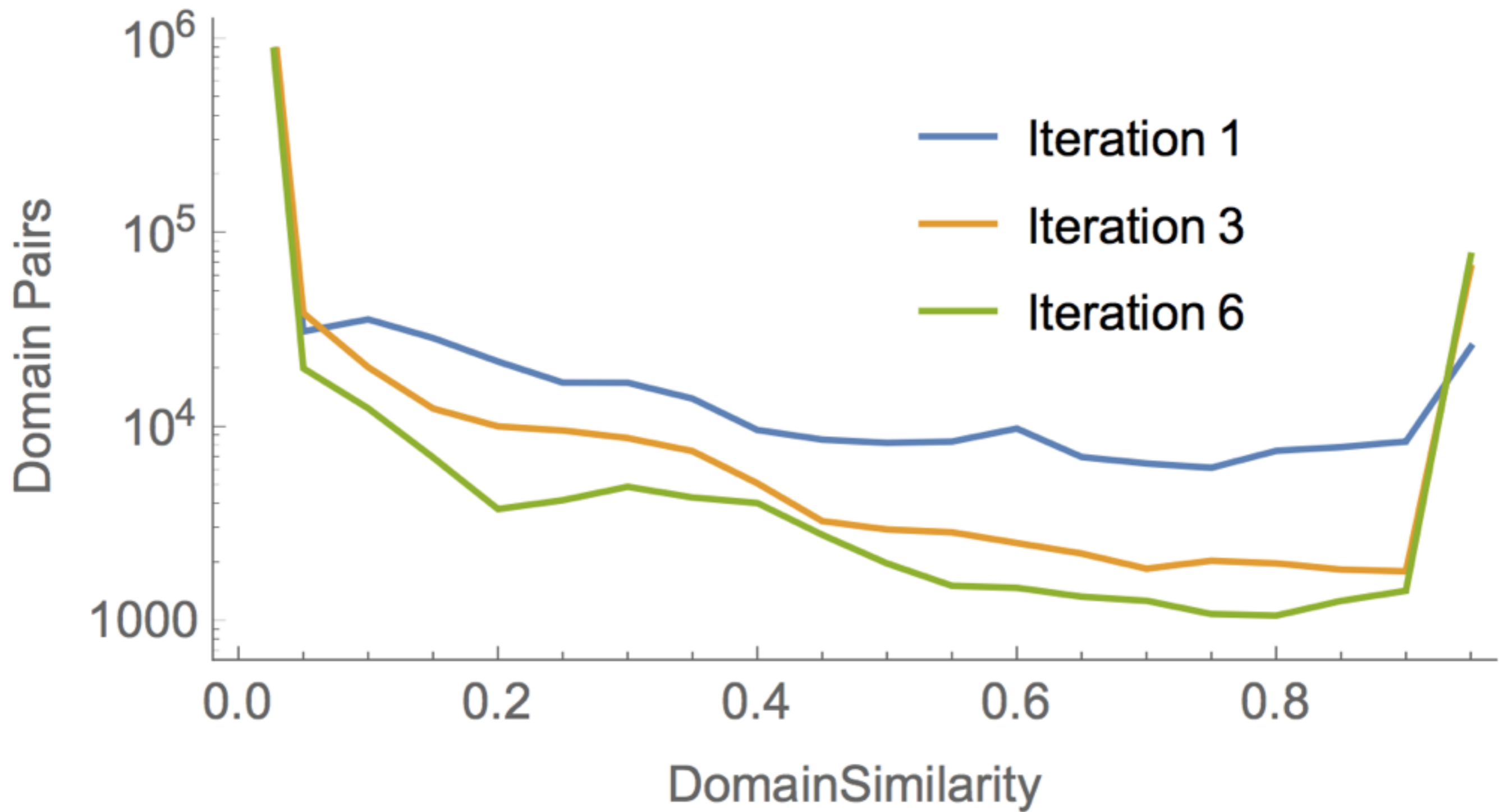
- DomainSimilarity(A,B)

$\langle \text{Resolutions of A, Resolutions of B} \rangle$

- IPTrust(A, IP)

$$\frac{\sum_D \text{DomainSimilarity}(D, A) \times \text{Resolutions to IP}}{\text{Resolutions to IP}}$$

Clusters appear through iterative computation to a fixed point



A few iterations produce well-defined clusters

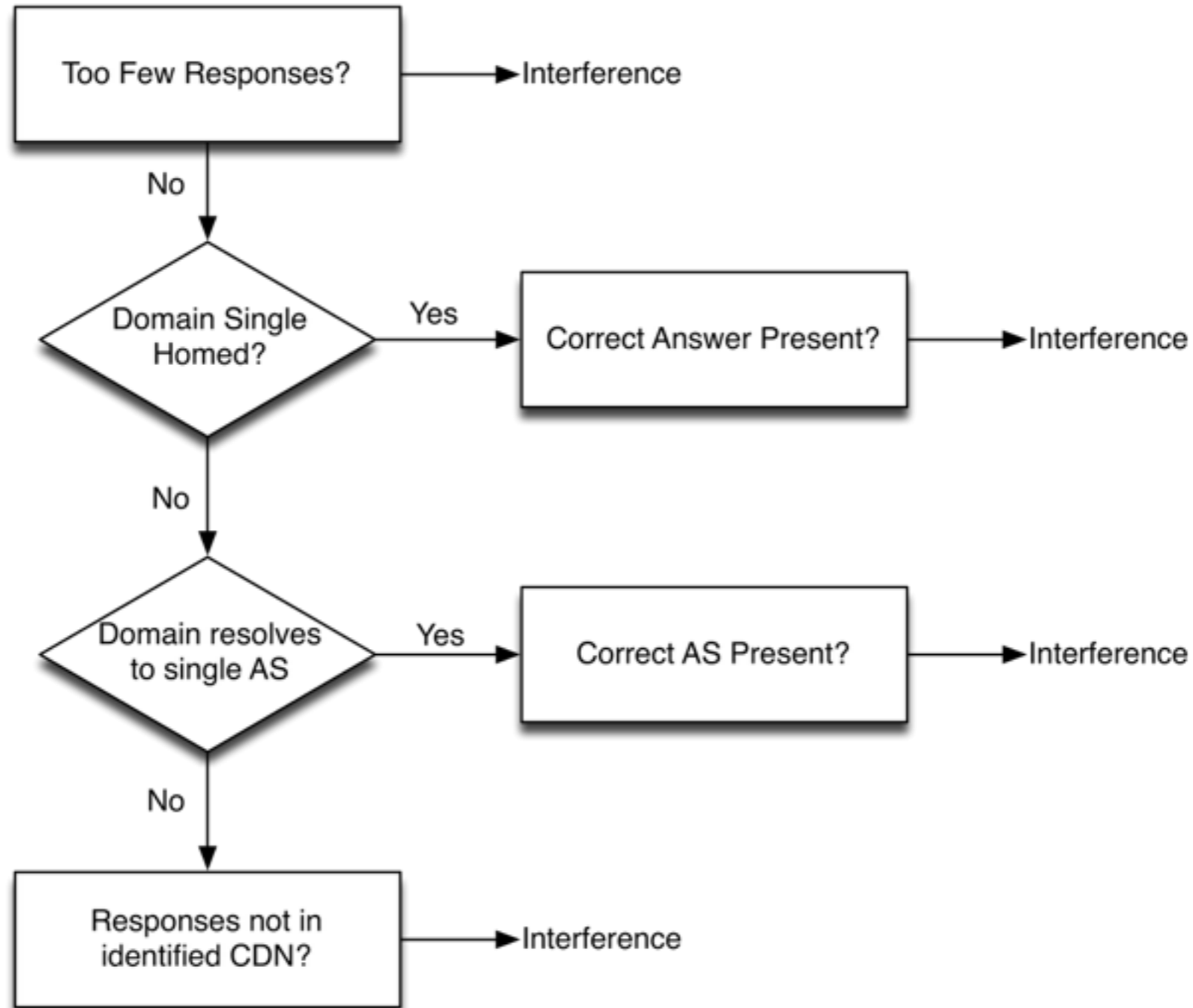
# CDNs

Fastly Domain	Alexa Rank
<a href="https://imgur.com">imgur.com</a>	47
<a href="https://cnn.com">cnn.com</a>	84
<a href="https://bbc.com">bbc.com</a>	131
<a href="https://wikihow.com">wikihow.com</a>	238
<a href="https://scribd.com">scribd.com</a>	449
<a href="https://kickstarter.com">kickstarter.com</a>	529
<a href="https://www.gov.uk">www.gov.uk</a>	684

# Implementation

- Weekly scan of top 10,000 domains
- 1 Machine. Modified zmap client
- Scan time of 3 days at 100,000 pps
- 300GB weekly collection
- 2 years of measurements, code

# Censorship

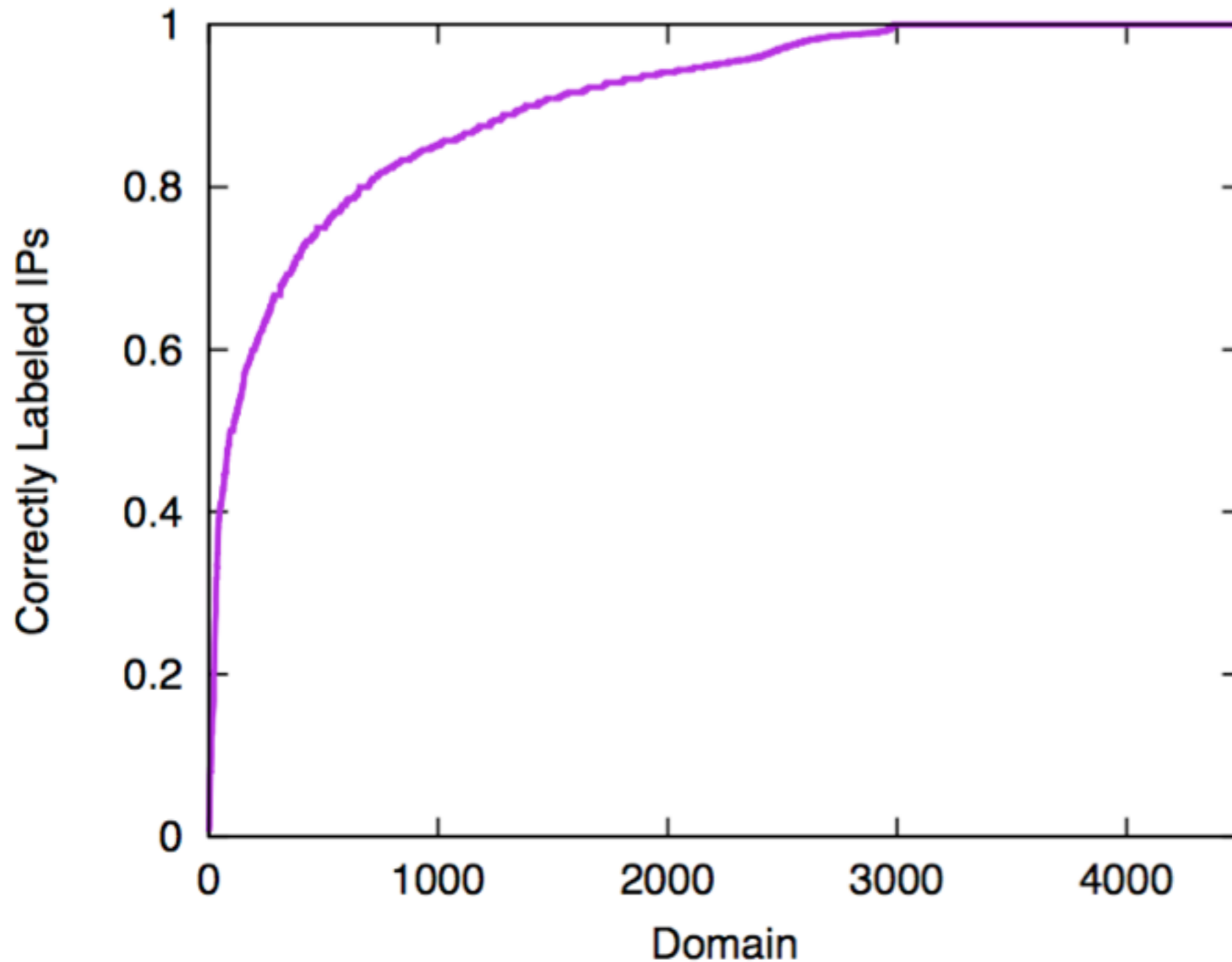


# Structure

- How & Why of measurement
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- **Results**



# Correctness

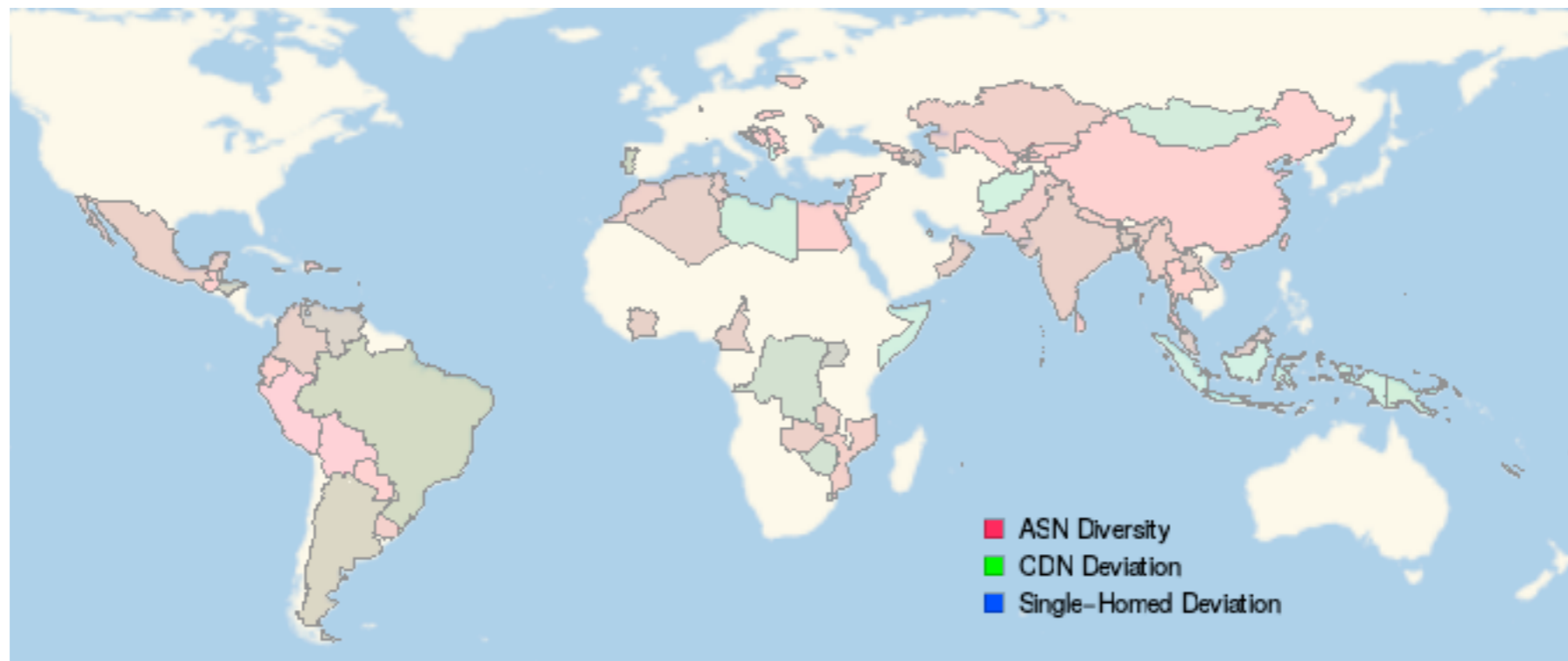


>90% identification. 95% of misidentifications are conservative

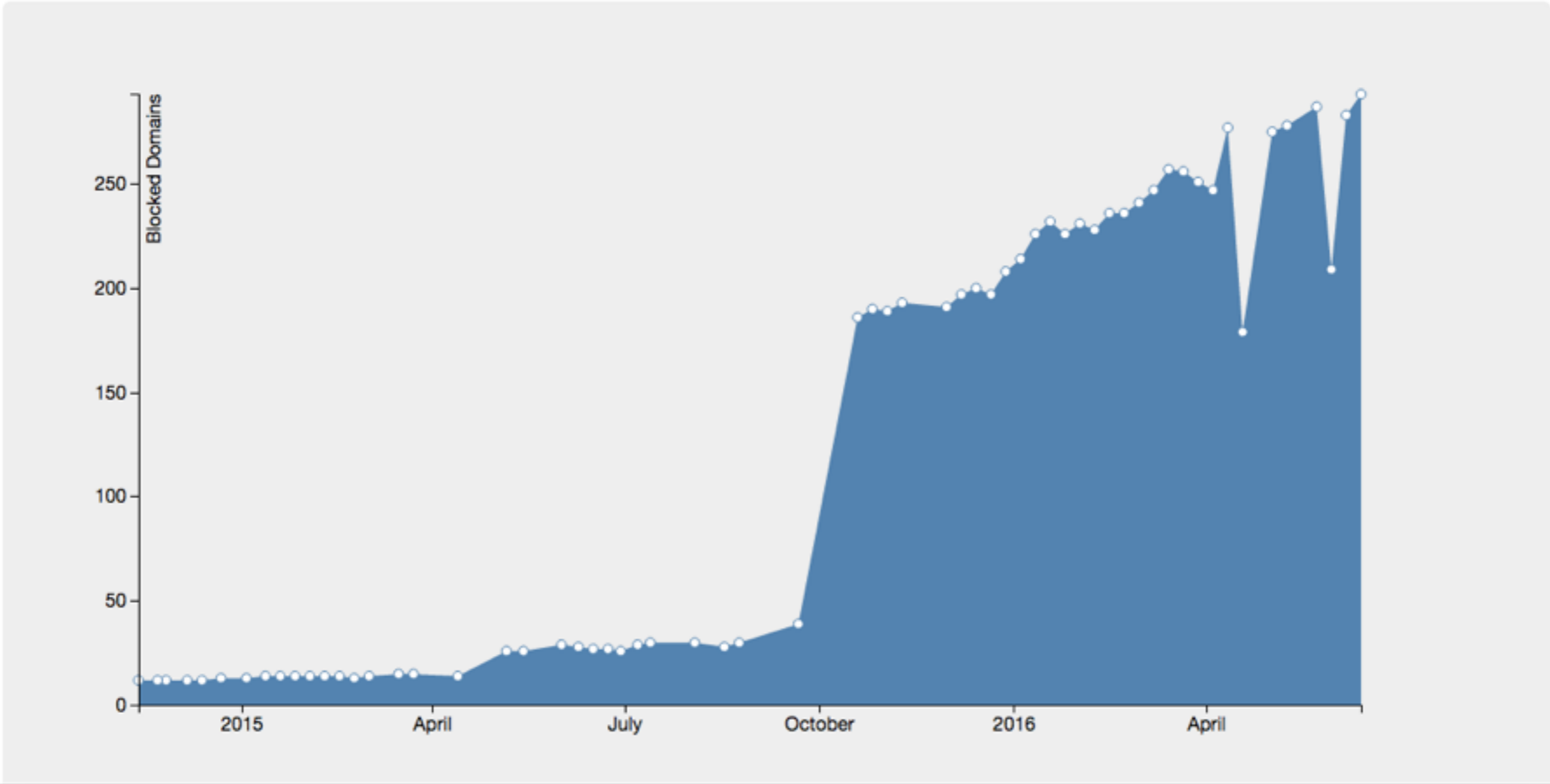
# CDNs

CDN	Size	Representative
CloudFlare	726	<a href="https://www.reddit.com">reddit.com</a>
AWS	647	<a href="https://www.amazon.com">amazon.com</a>
Akamai	410	<a href="https://www.ebay.com">ebay.com</a>
Google	141	<a href="https://www.google.com">google.com</a>
Dyn	112	<a href="https://www.webmd.com">webmd.com</a>
Rackspace	77	<a href="https://www.wikihow.com">wikihow.com</a>
Fastly	72	<a href="https://www.imgur.com">imgur.com</a>
Edgecast	68	<a href="https://www.soundcloud.com">soundcloud.com</a>
Incapsula	55	<a href="https://www.wix.com">wix.com</a>

# Censorship



# Satellite | Interference in Iran



# Satellite



Will Scott <[wrs@cs.washington.edu](mailto:wrs@cs.washington.edu)>  
[satellite.cs.washington.edu](http://satellite.cs.washington.edu)

- CDN mapping and censorship detection are related
- Satellite estimates both from observed behavior
- Public dataset of weekly global measurements of Alexa top 10,000 domains from a single machine