Quantifying the Impact of Blocklisting in the Age of Address Reuse

Sivaram Ramanthan , Anushah Hossain, Jelena Mirkovic, Minlan Yu and Sadia Afroz

IP Blocklists

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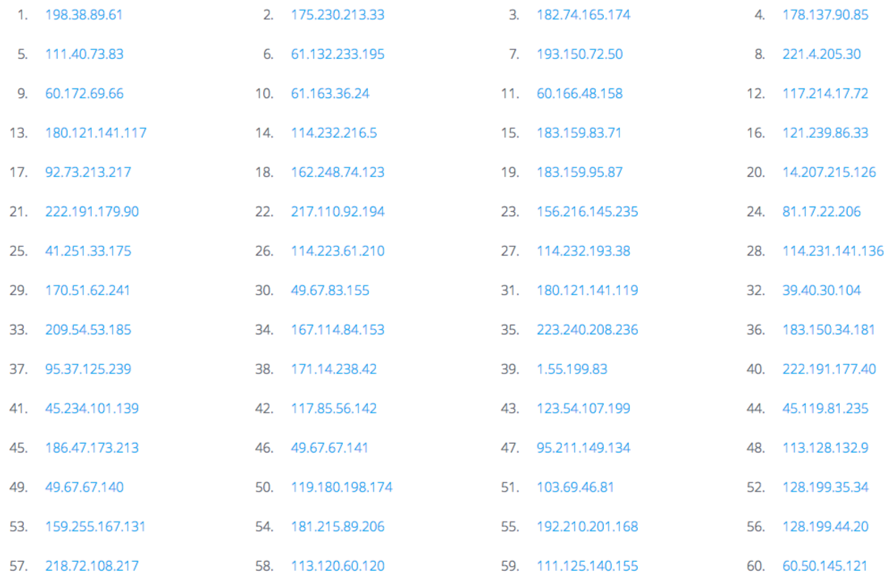
- IP Blocklists are commonly used to block attack traffic.



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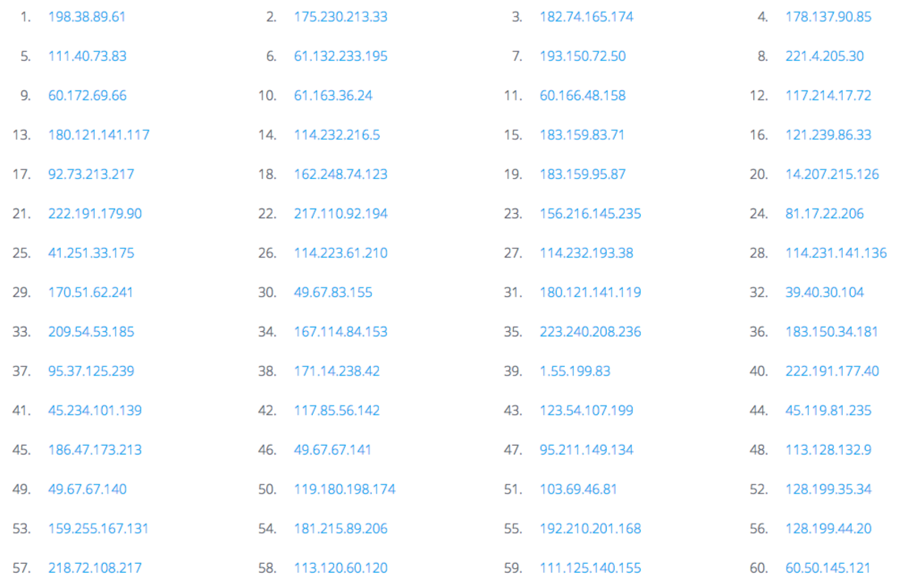
- IP Blocklists are commonly used to block attack traffic.
- Blocking reused addresses can lead to unjust blocking of many more users.



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ALIEN VAULT

SPAMHAUS

SNORT

PROJECT HONEY POT

Malwarebytes

Case 1: Blocklisting Reused Addresses: NAT

https://community.cloudflare.com/t/cloudflare-blocking-my-ip/65453/57

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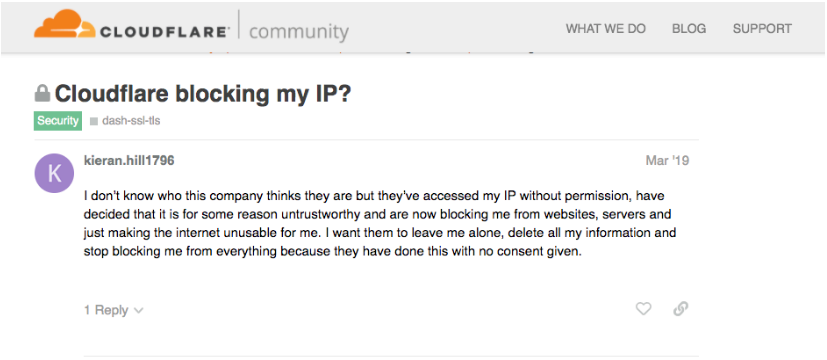

Cloudflare blocking my IP?

Security dash-ssl-tls

kieran.hill1796 Mar '19

I don't know who this company thinks they are but they've accessed my IP without permission, have decided that it is for some reason untrustworthy and are now blocking me from websites, servers and just making the internet unusable for me. I want them to leave me alone, delete all my information and stop blocking me from everything because they have done this with no consent given.

1 Reply

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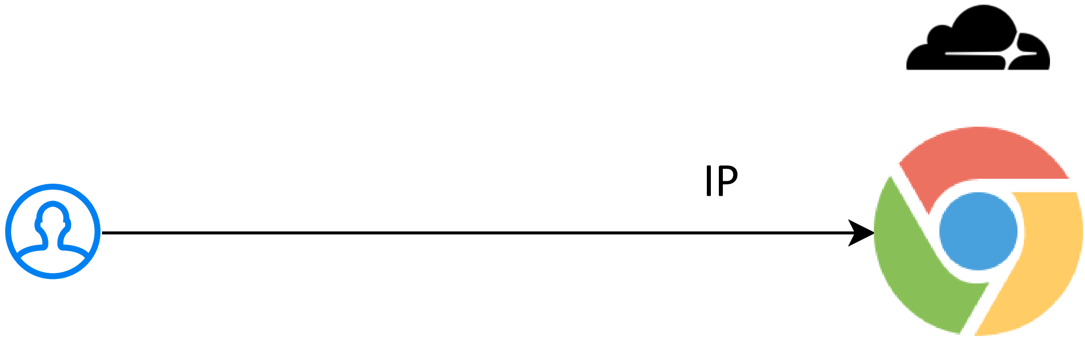

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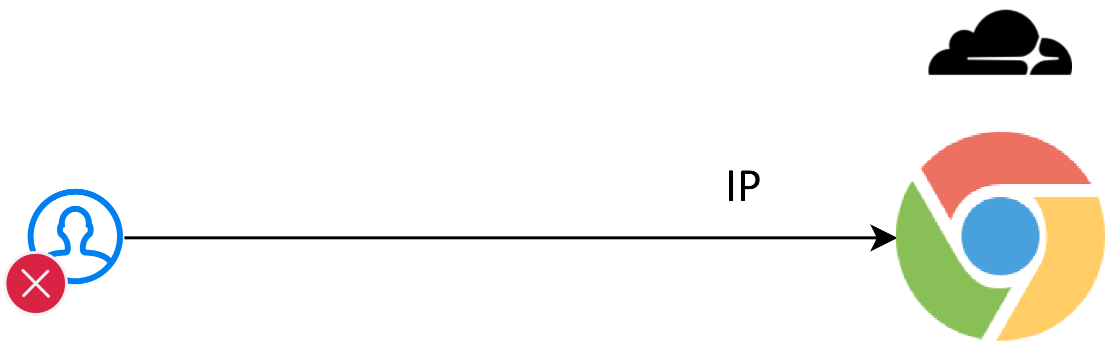

Cloudflare uses Dshield blocklist.

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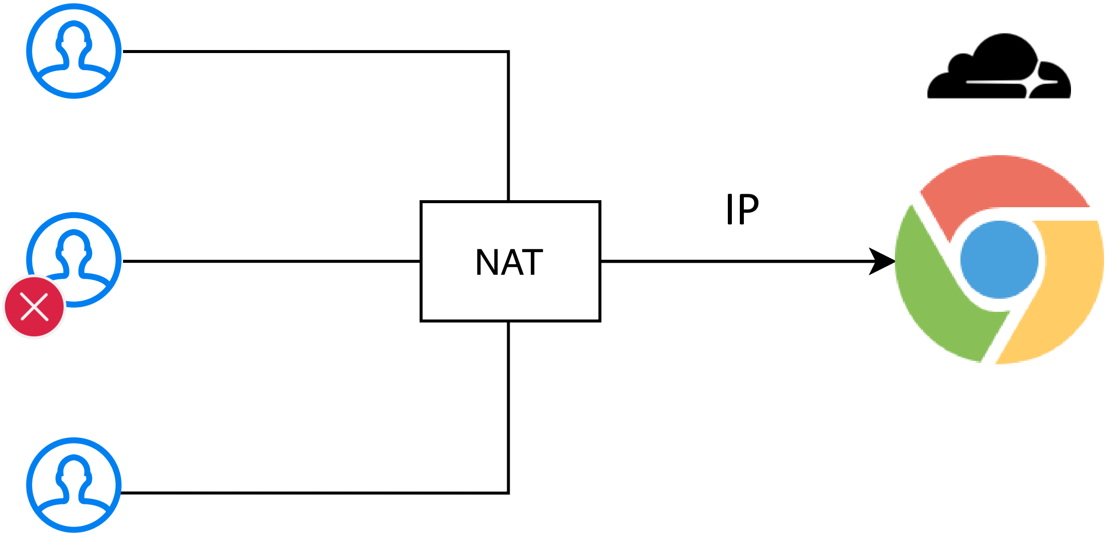

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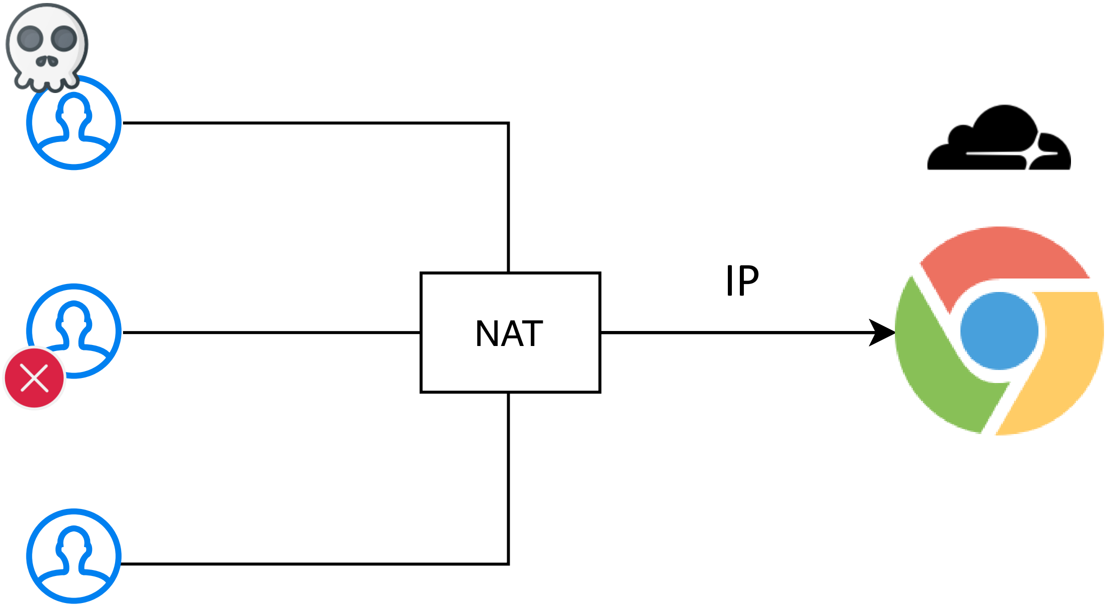

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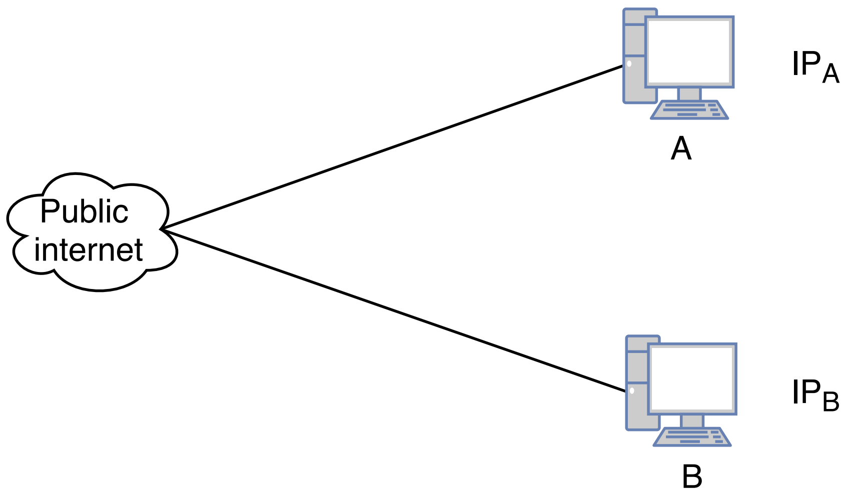

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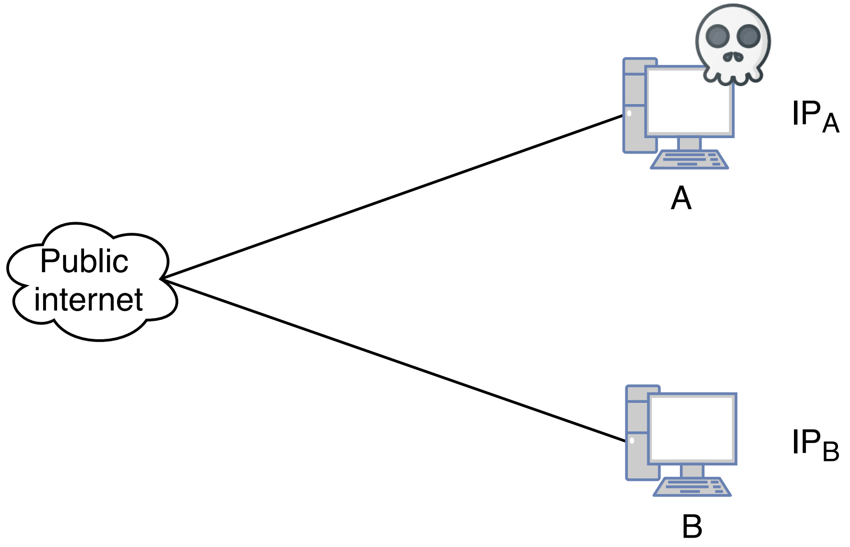

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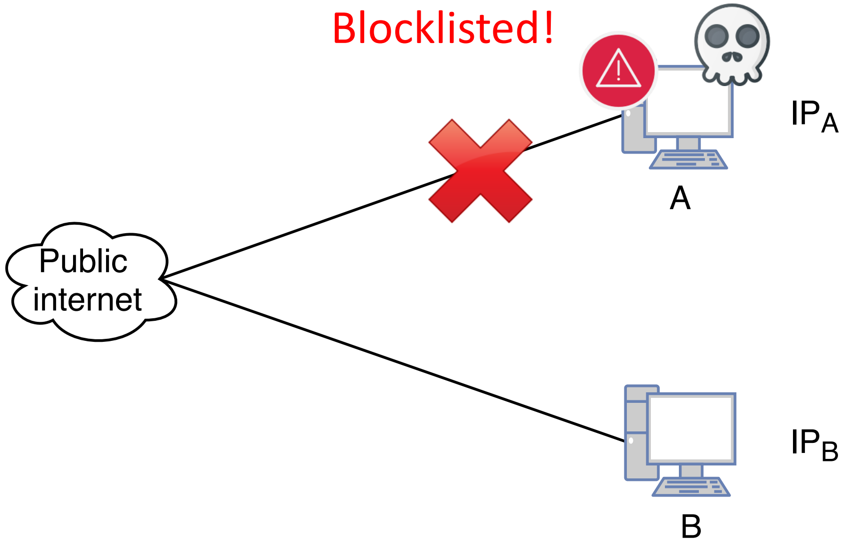

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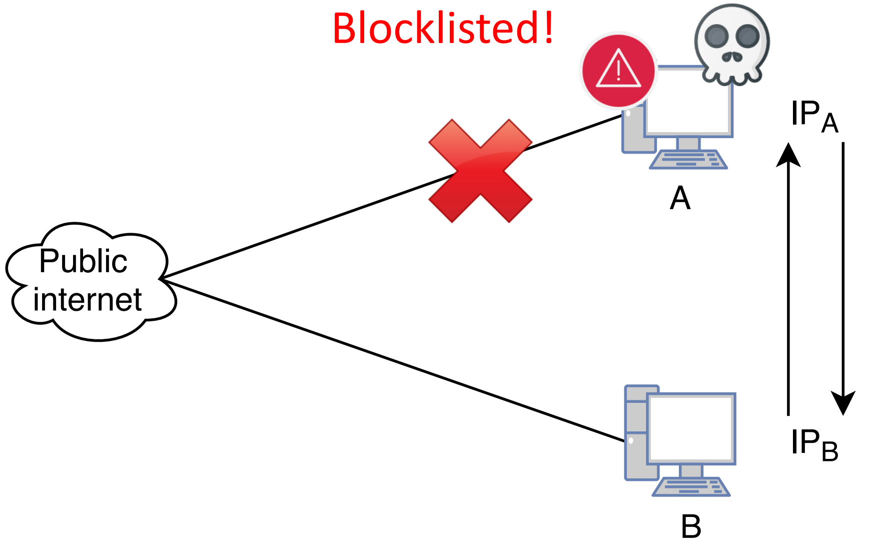

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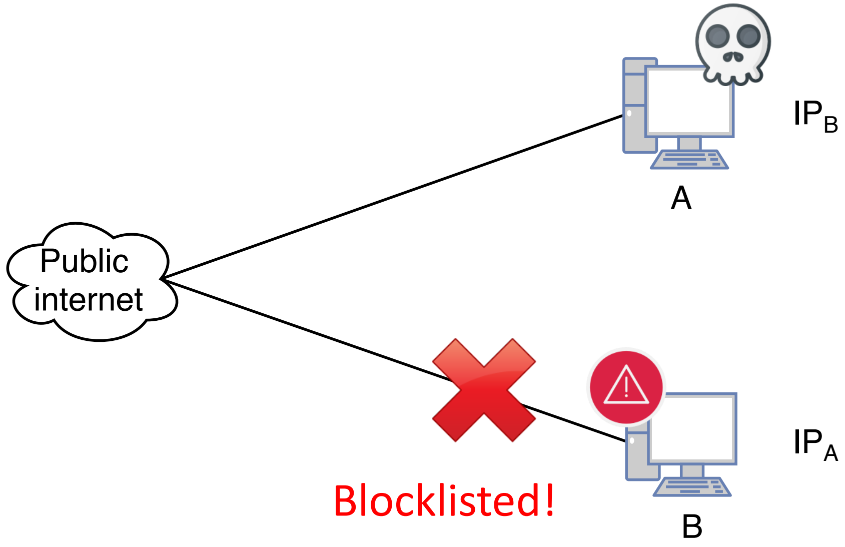

Public internet

IP_B

A

Blocklisted!

IP_A

B

Usage and Perception of Blocklists

- Surveyed 40 network operators to understand usage of blocklists and their anecdotal experiences on blocklisting reused addresses.
- Blocklists are commonly used and used for active defense:
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- Blocklists are commonly used and used for active defense:
    - 70% of operators used blocklists and 60% of them use blocklists to directly block traffic.
- Blocklists can have inaccuracies due to reused addresses:
    - About 56--76% of operators feel inaccuracies in blocklists due to reused addresses.

What is our study?

Quantifying the Impact of Blocklisting

- Accurately identifying reused addresses.

- Identifying blocklists that list such reused addresses.

- Quantifying the impact of blocking reused addresses.

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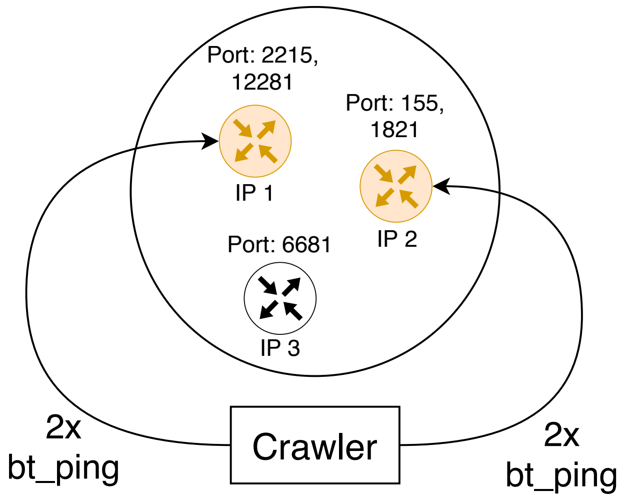
- Quantifying the impact of blocking reused addresses.
  - Impact on the number of addresses potentially affected due to blocking reused addresses.

Our Techniques.

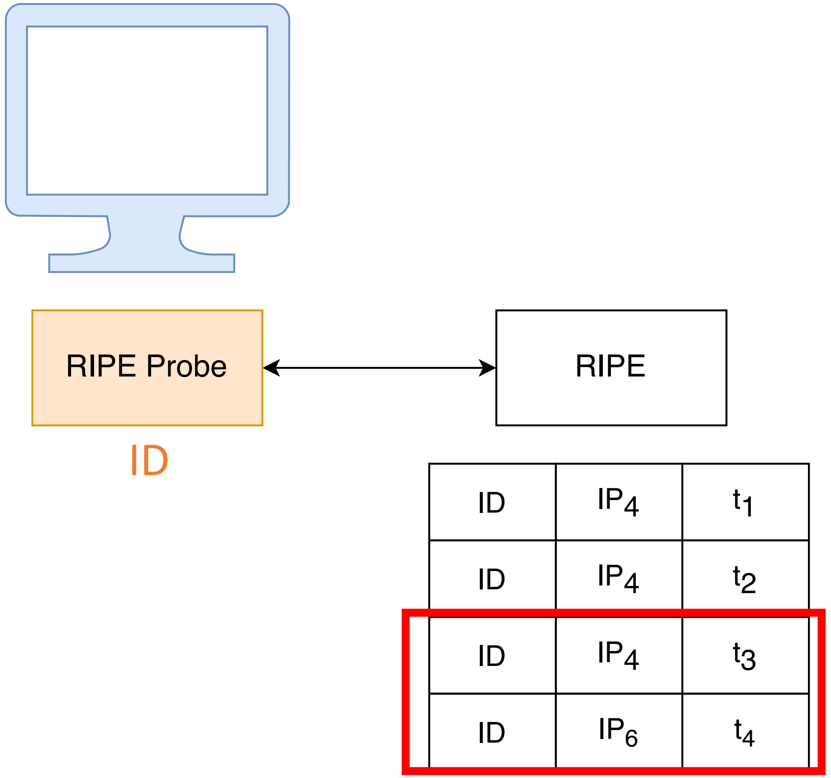
Detecting Reused NATed addresses

- We use the BitTorrent Network to identify users that are allocated the same IP address.
- The BitTorrent protocol allows two messages that helps us identify NATted users accurately.
  - *get_nodes*: Returns a list of active neighbors to a node.
  - *bt_ping*: Periodically pings active neighbors.



Detecting Dynamic Addresses

- RIPE atlas measurement logs contain the IP addresses allocated to RIPE probes over time.
- Analyzing the monitoring logs, we can obtain RIPE probes that are potentially in dynamically allocated address spaces.



ID	IP_4	t_1
ID	IP_4	t_2
ID	IP_4	t_3
ID	IP_6	t_4

IP4 and IP6 are potentially dynamically allocated.

Quantifying Impact with Blocklists

- We use the BLAG dataset that actively maintains blocklisted addresses from public blocklists.
- 151 blocklists that monitor variety of attacks including Spam, DDoS, malware hosting or reputation of IP addresses.
- Monitoring period of 83 days over two measurement periods.
- Observed 2.2M blocklisted IP addresses.

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  - Reused addresses are removed quicker than other blocklisted addresses (3—9 days).
  - 77% of all dynamic addresses are removed within 2 days.
- How many users are affected?
  - As many as 78 users can be potentially affected.

Thank You! Questions?

All detected reused addresses are present in:

https://steel.isi.edu/members/sivaram/blocklisting_impact/

All monitored blocklists are available at:

https://steel.isi.edu/Projects/BLAG/

USC University of Southern California

ICSI

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