Analysis of IPv4 Address Space Utilization with ANT ISI Dataset and Censys

Manasvini Sethuraman, Zachary. S. Bischof and Alberto Dainotti
Georgia Tech

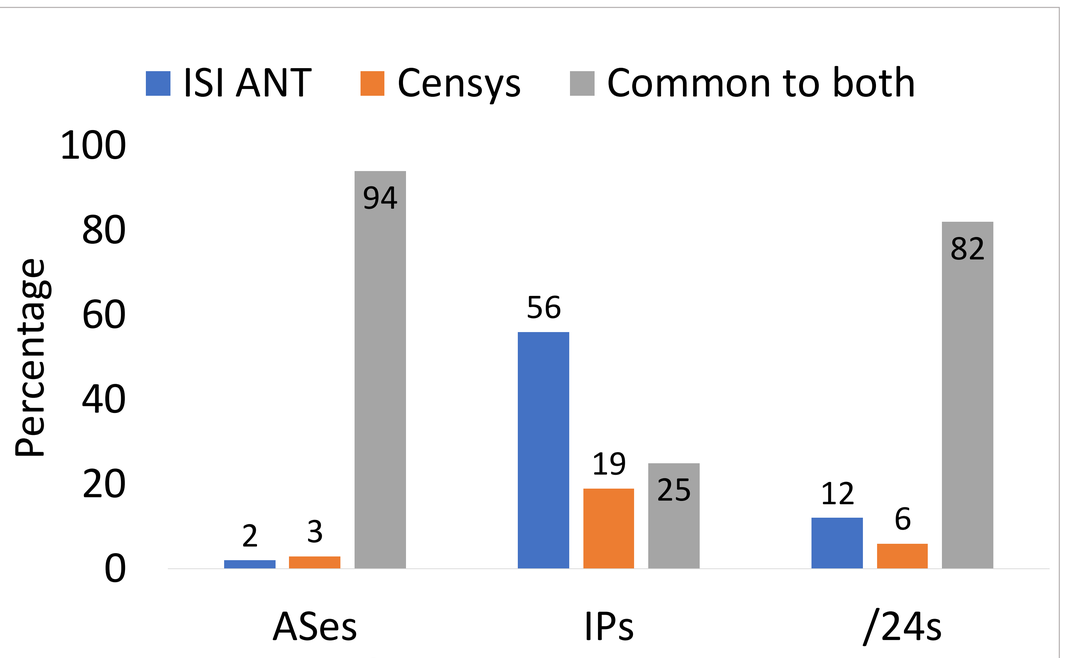
Goal: Improve coverage of IPv4 address space utilization

Motivation: Some networks ignore ICMP probes

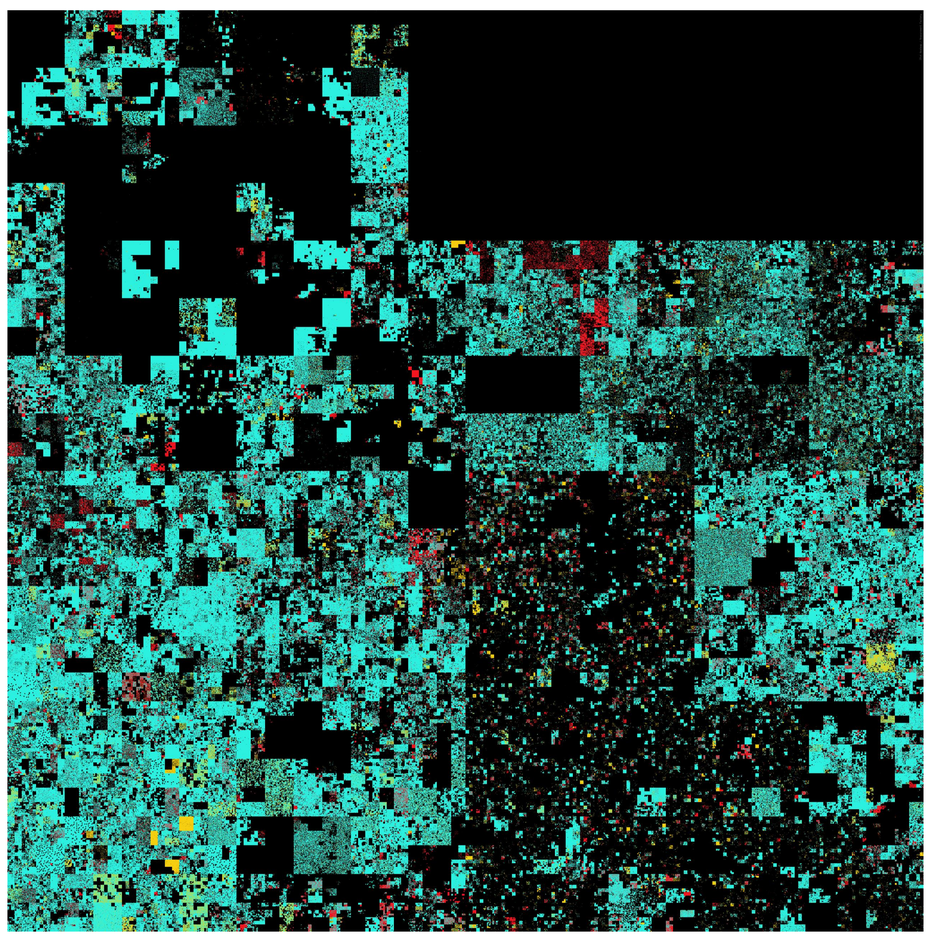
Key Idea: Leverage internet wide scan data to supplement ICMP probing

Datasets

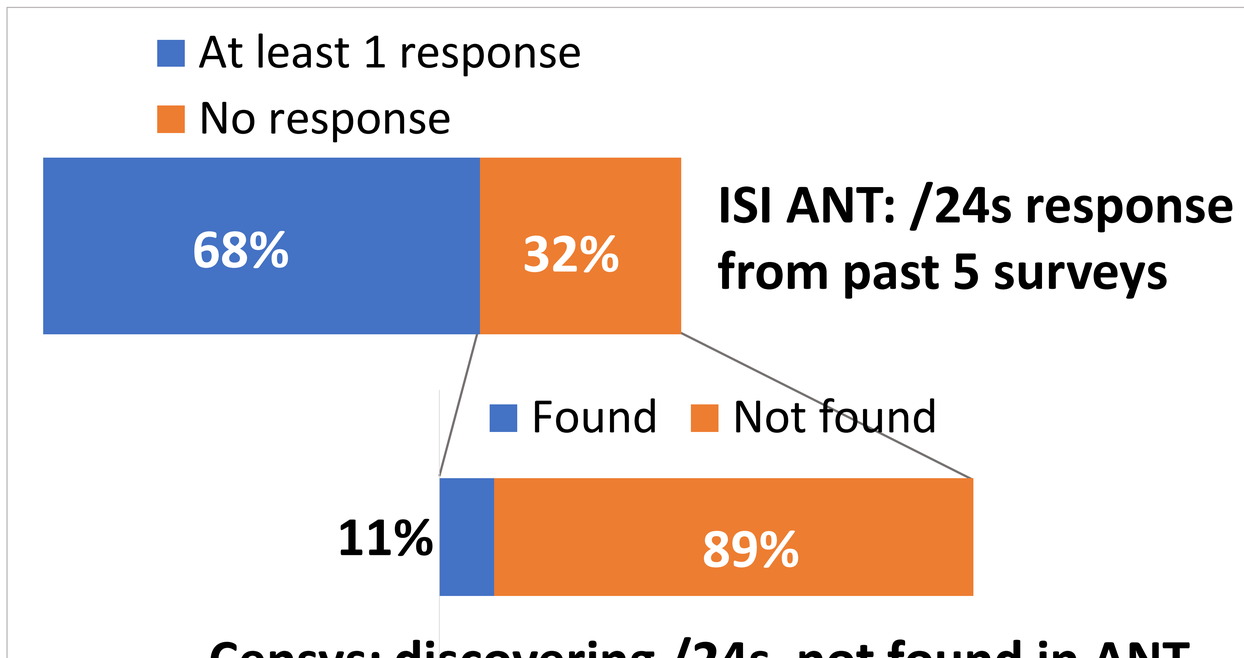
- **ISI ANT IP History dataset**
  - Record ICMP probe responses from 80+ censuses over 20 years
- **Censys Universal Internet dataset**
  - TLS/Telnet/SSH/… handshake data



AS, IP and /24 level coverage of the datasets



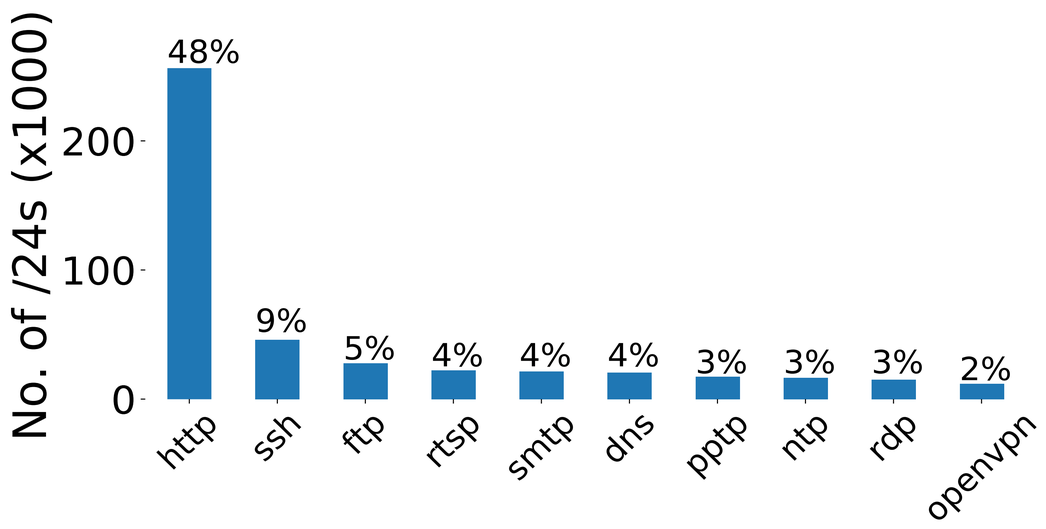
Hilbert space representation of /24s in ISI ANT (red), Censys (gold) and both datasets (cyan)



Censys: discovering /24s not found in ANT

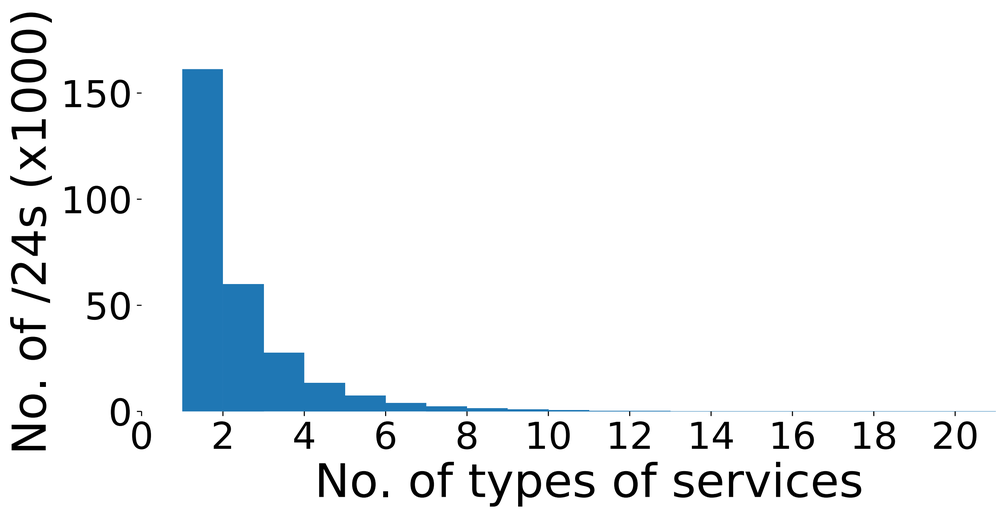
Difference in coverage between ISI ANT and Censys

11% of /24s (corresponding to 4% of hosts) that did not respond in the past five ANT surveys were found in the most recent Censys scan



Services on hosts unique to Censys

HTTP and SSH are the most popular services



Most hosts run 1 or 2 types of services

Future Work

- Investigate stability of Censys coverage
- Incorporation of TLS/SSH scans in outage detection