Annotated Bibliography – Duke ReCLS

[1] N. Spring, R. Mahajan, D. Wetherall, “Measuring ISP Topologies with Rocketfuel”. Available: <https://research.cs.washington.edu/networking/rocketfuel/papers/sigcomm2002.pdf>.

Most internet service providers (ISP) don’t release their topologies; the goal of this paper was to use minimal measurements to guess the ISP maps by creating Rocketfuel (mapping engine). Used trace-route approach, which is a text-based approach. Tested directed probing and path reduction techniques on 10 ISPs by using 750 publicly available traceroute sources. Used DNS to identify routers that belong to each ISP. Results show that backbone design is pretty diverse between ISPs. POP designs were similar to each other. When checked with 3 ISPs for accuracy, they all said the maps were good. Other validation techniques like using IP address prefixes and comparisons with RouteViews & Skitter show the maps generating with directed probing and path reduction were pretty comparable to other methods.

Section 2:

ISP network – Multiple points of presence (POPs), which is where the ISP has a collection of routers. Backbone: connects POPs, Backbone/core routers: routers attached to inter-POP links. Access routers: create intermediate layer between ISP and routers in neighboring networks.

Traceroute – creates a map of how internet data travels from source to destination

Issues: ip addresses belonging to the same router (aliases) have to be resolved – uses a pair-wise test that uses IP identifier, rate-limiting and TTL values. Also need to identify geographical location of router – can use location hints in the DNS name

Section 3:

Direct probing – uses BGP tables to remove irrelevant traceroutes. BGP table: maps destination IP address prefixes to AS-paths that are used to reach destination. AS-paths: checks which autonomous systems to travel through to get to a destination

Path reductions – used to identify redundant traceroutes

Section 4:

Rocketfuel – mapping engine that uses direct probing and path reductions to create maps

Original data are from public traceroute servers

Section 5:

Backbone design is very different depending on ISP – most are similar to AT&T’s network topology where hubs are in major cities and spokes fan out to smaller satellite POPs. Newer one has POPs only in major cities, then majorly connected to each other

POP design is relatively similar – few backbone routers, dense mesh

[2] T. Koch *et al*., “Towards a traffic map of the Internet”. Available: <https://www.microsoft.com/en-us/research/uploads/prod/2021/10/traffic-map.pdf>.

Mapping routes is crucial to understanding the most used networks/paths/destinations. Research paper highlights the benefits to developing an Internet traffic map (understanding network blackouts, insight to making policies, understanding how Internet traffic affects research results, etc.). They acknowledge that creating a map will also mean creating new measurement methods, which means much more extensive research. The research paper hopes that more public data can be made available and the Internet traffic map won’t need to depend on private data