

Name: _____

This week's readings

- [1] Lixin Gao. On inferring autonomous system relationships in the Internet. *IEEE/ACM Transactions on Networking*, 9(6):733–745, December 2001. URL <http://www-unix.ecs.umass.edu/~lgao/ton.ps>.
 - [2] Ramesh Govindan and Hongsuda Tangmunarunkit. Heuristics for Internet map discovery. In *Proceedings of the IEEE Joint Conference of the IEEE Computer and Communications Societies (INFOCOM)*, pages 1371–1380. Tel Aviv, Israel, March 2000. URL http://www.isi.edu/div7/publication_files/heuristics.pdf.
 - [3] Vern Paxson. Strategies for sound Internet measurement. In *Proceedings of the ACM SIGCOMM Internet Measurement Conference (IMC)*, pages 263–271. Taormina, Sicily, Italy, October 2004. URL <http://www.icir.org/vern/papers/meas-strategies-imc04.pdf>.
 - [4] Allen B. Downey. Using pathchar to estimate Internet link characteristics. In *Proceedings of the ACM SIGCOMM Conference on Applications, Technologies, Architectures, and Protocols for Computer Communication*, pages 241–250. Cambridge, MA, September 1999. URL <http://allendowney.com/research/clink/downey.ps.gz>.
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1. Mercator modified traceroute to find paths through the network. Run traceroute from your machine to anywhere else on the Internet, print the output, then annotate the output with as much as you can infer: geography, provider, odd delay, firewall blocking, whatever you find. (For example, run “script”, then “traceroute [somewhere]”, “exit”, “enscript -G typescript”, although your command list may differ.)

2. Explain how *localpref* affects BGP path selection and allows Gao to infer provider-customer relationships.

3. Explain how *export filtering* affects BGP path selection and allows Gao to infer provider-customer relationships.
4. Mercator used “informed random address probing.” What does that mean?
5. How long does it take Mercator to map the Internet? Can you think of ways it might be made faster?

Vocabulary (some of this may be covered in class)

- active measurement
- alias resolution
- AS prepending
- asymmetric routing
- Autonomous System
- BGP Peer
- community tags
- early-exit
- export filtering
- ICMP
- ICMP host unreachable
- ICMP port unreachable
- ICMP time exceeded
- Internet (different from an internet)
- internet (different from The Internet)
- IP TTL
- late-exit
- libpcap
- localpref
- loose source routing
- MED
- multiple origin AS conflict
- origin AS
- passive measurement
- path vector routing
- policy routing
- prefer-customer rule
- raw sockets interface
- Route Views
- source routing
- traceroute
- transit AS
- UDP
- valley-free routing