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A Distributed Platform for High-Speed Active Network Topology Discovery

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Prior collaborative work with LTS has produced a novel high-speed active network mapping tool, "Yarrp" (Yelling at Random Routers Progressively). Yarrp is unique in that it is stateless and randomly permutes the order of its probing, thereby providing a means to perform Internet-scale traceroute style network discovery. While relatively small Yarrp runs have been performed on the live Internet and demonstrated Yarrp's ability to operate an order of magnitude faster than competing approaches, the focus of this proposal is to enhance Yarrp so that it can run continually in a production environment to provide a near real-time view of the network topology. As such, we propose the following primary research thrusts:

1) Further increase Yarrp's speed

2) Evaluate potential commercial platforms for Yarrp deployment

3) Develop distributed Yarrp

4) Use Yarrp to map the IPv6 Internet

These thrusts are intertwined, but each is crucial to the eventual production deployment of Yarrp. For instance, to achieve the necessary mapping speed, we will both optimize and distribute Yarrp. And, deployment on existing commercial cloud platforms will require the special probe header encoding in Yarrp to be robust to real-world NATs and security appliances. The end result of our proposed effort is a distributed version of Yarrp that map the IP-level data-plane path to every /24 prefix in the IPv4 Internet in less than an hour.
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