Project title: Joint Routing and WAN Optimization for Elastic Traffic

Overview:

Much of the world's data and computation is moving to the cloud. With the proliferation of devices such as smart phones and big data applications, the traffic over our network has kept on growing fast and becoming more dynamic. In this picture, networking becomes even more crucial as it is networks that connect servers to form datacenters and link datacenters and users together. To meet the new requirements in this new era, networks must be orders of magnitude better in terms of flexibility and performance. And that requires much finer-grained network management, so that it can react fast, move load accurately and serve different applications accordingly.

The overall goal of my research is to realize such a network management. In this project, particularly, we want to focus a critical technology challenge that is key to realize the benefit of such network management, i.e., enabling joint transport layer and network layer optimization. This cross-layer optimization has been studied abstractly as a mathematical problems from various angles for a long time. However, it has been considered a bad idea from a systems point of view since it breaks the Internet layering structure and is hard to realize among ISPs with standard routers. Now with enterprises such as IBM, Google, Microsoft, Amazon etc. operating their inter-datacenter WANs with increasingly usage of SDN based switches, it becomes clear that such a cross layer optimization is not just desirable, but more importantly, potentially feasible. This project will focus on joint routing and WAN optimization for TCP flows to maximize their throughput.

Specific MEEng Contribution:

1. Realize a basic WAN OP setup with TCP proxies along one path;
2. Realize the capability of choosing an optimal path based on WAN OP results.

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Outside Field Advisor Name (if applicable):
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Project Web Site: N/A
**Number of MEng Students Needed:** 2

**Required Skills:** Basic knowledge on computer networking. Proficiency in Programming. Kernel Programming experience is a plus but not required.

**Estimated Project Time Frame:**

2018-19 Academic Year, Two (2) Semesters