Announcing the Final Examination of Austin Jerome for the degree of Master of Science

Time & Location: October 30, 2017 at 11:30 AM in Harris Engineering Cooperation 450
Title: Load-Balancing in local and metro-area networks with MPTCP and OpenFlow

In this thesis, a novel load-balancing technique for local or metro-area traffic is proposed in mesh-style topologies. The technique uses Software Defined Networking (SDN) architecture with virtual local area network (VLAN) setups typically seen in a campus or small-to-medium enterprise environment. This was done to provide a possible solution or at least a platform to expand on for the load-balancing dilemma that network administrators face today. The transport layer protocol Multi-Path TCP (MPTCP) coupled with IP aliasing is also used. The trait of MPTCP of forming multiple subflows from sender to receiver depending on the availability of IP addresses at either the sender or receiver helps to divert traffic in the subflows across all available paths. The combination of MPTCP subflows with IP aliasing enables spreading out of the traffic load across greater amount of links in the network, and thereby achieving load balancing and better network utilization. The traffic formed of each subflow would be forwarded across the network based on ‘trees’ which are created in association with each switch in the topology which are directly connected to hosts. The amount of ‘trees’ in the topology would also depend on the number of VLANs setup for the hosts in the topology. This segregation would allow for network administrators to monitor network utilization across VLANs and give the ability to balance load across VLANs. We have devised a number of experiments in Mininet, and the experimentation showed promising results with significantly better throughput and network utilization compared to cases where normal TCP was used to send traffic from source to destination. Our study clearly shows the advantages of using MPTCP for load balancing purposes in SDN type architectures and provides a platform for future research on using VLANs, SDN, and MPTCP for network traffic management.

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Approved for distribution by Mostafa Bassiouni, Committee Chair, on October 11, 2017.

The public is welcome to attend.