Restructuring Endpoint Congestion Control

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ABSTRACT

The Congestion Control Plane (CCP) is a new way to structure congestion control functions at the sender by removing them from the datapath. With CCP, each datapath such as the Linux Kernel TCP, UDP-based QUIC, or kernel-bypass transports like mTCP/DPDK summarizes information about the round-trip time, packet receptions, losses, ECN, etc. via a well-defined interface, and algorithms running atop CCP can use this information to control the datapath's congestion window or pacing rate. CCP improves both the pace of development and ease of maintenance of congestion control algorithms by providing better, modular abstractions, and enables new capabilities such as sophisticated congestion control using signal processing techniques running on Linux TCP and aggregate congestion control across groups of connections, all with one-time changes to datapaths. We propose a set of congestion control primitives datapaths should expose to support a broad class of congestion control algorithms; this set of primitives could eventually be standardized as a reference for future datapath developers' support for congestion control in their datapaths. Based on work published at [1].

[1] Akshay Narayan, Frank Cangialosi, Deepti Raghavan, Prateesh Goyal, Srinivas Narayana, Radhika Mittal, Mohammad Alizadeh, Hari Balakrishnan. "Restructuring Endpoint Congestion Control". SIGCOMM 2018.