Observing alternative TCP variants and congestion control mechanisms on high bandwidth-delay product networks

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Abstract

In this paper, we are going to investigate several TCP variants on high bandwidth-delay product (WAN) networks in terms of performance and fairness. By increasing both bandwidth and latency, the effectiveness of conventional TCP transmission – especially transmission of large data – is significantly reduced. Many TCP variants have been developed so far in order to eliminate transmission bottleneck, therefore enhance performance, whereas the bandwidth of Internet backbone links has been dynamically increasing in the last couple of years (>Gbps). The mentioned problem is actually rooted on the transmission rate control of window-based congestion control mechanism. We know that the size of congestion window is derived from the arrival time of ACK packets that is mainly the function of network latency (RTT). Consequently, the algorithm cannot effectively exploit the available bandwidth on high bandwidth-delay links. The appiled AIMD *(Additive Increase, Multiplicative Decrease)* algorithm increases congestion window relatively moderately, therefore, it has a slow response to available high bandwidth. Moreover, the control effect of TCP self-clocking mechanism actually depends also on concurrent TCP flows passing through the same physical link.

In order to become applicable on a wide spectrum of network conditions, a TCP variant has to provide enhanced results in both performance and fairness on high bandwidth-delay networks. We are going to analyse novel congestion control mechanisms considering these two aspects together in a real high BDP network environment.