Jongwon Yoon

TCP Vegas: New techniques for congestion detection and avoidance

This paper proposed modifications to TCP, called TCP Vegas, to achieve better throughput and reduce the loss rate. From the simulation results, Vegas improves 50% on throughput, and only half the losses compared to TCP Reno. There are five techniques Vegas uses to improve the performance.
First, to calculate the RTT more accurately, Vegas uses system clock each time a segment is sent and ACK is arrived. Second, Vegas extends the duplicate ACK mechanism not to wait longer than necessary. Vegas retransmits the segment without having to wait for n duplicate ACKs using timestamps. Third, Reno doesn't adequately decrease the congestion window. However, Vegas only decreases the congestion window size due to the current loss and detects the loss better than Reno. Forth, many Reno losses are due to a failure in the self-clocking mechanism that result in spikes in the sending rate. Vegas allows twice max-segment bytes on each segment spacing interval to suppress the spikes. Finally, Vegas detects the congestion at the incipient stages by proactive manner and maintains the right amount of extra data in the network. Vegas uses RTT value to measure the expected throughput and compare it to the actual current data to adjust the window size accordingly. For slow-start, Vegas allows exponential growth every other RTT and keeps the congestion window fixed in between so a valid comparison of the expected and actual rates can be made. When the actual rate decreases below the expected rate, it changes to linear increase/decrease mode.

With different scenario simulations and measurement over the internet, they show that the performance of Vegas is better than that of Reno. The results support the Vegas well. However, for some threshold values, such as alpha and beta, in experiment with background traffic, they don't explain why they choose that specific values, 1, 3 and 2, 4 pairs. They just mentioned they select these values to study the sensitivity of Vegas algorithm, but they should have tested with larger range of threshold. 1, 3 and 2, 4 pairs don't seem like to adequate to the large variation.