

Assignment 2

Network Performance using Different TCPs

Due: 08-10-2023

Basics

TCP BBR is a new congestion control algorithm developed by Google for data center networks. BBR stands for “Bottleneck Bandwidth and Round-trip propagation time”. The traditional TCP control algorithms have low throughput because of misinterpreting the packet drop event in shallow buffers as a signal of congestion in the network, and the buffer bloat problem in deep buffers. In TCP BBR, it considers the network’s delivery rate and round-trip time to achieve the maximum bandwidth and to minimize the delay. It significantly increases the network throughput comparing to other TCP control algorithms.

This is an individual assignment and has to be done without the assistance of others.

Getting Started

You are encouraged to read some tutorials on different implementations of TCPs over different networks (there are few survey papers on the course website that can be of a good starting point). Then, understand the different TCP designs and where they achieve the best results. For example, you may find TCP Vegas is the best for delay? While, High-speed TCP or binary TCP are great for optical networks. Others are fair to the link share! Try to observe the effect of the different TCP strategies over both wired and wireless interfaces.

Assignment

The utility iPerf, which you studied in Assignment 1, is used to measure the maximum achievable bandwidth. You are to use iPerf to generate traffic over different TCP flavors including TCP BBR. Three other TCP algorithms to be used, cubic, reno, and vegas. All of these TCP control algorithms are implemented in the Linux Kernel 4.9 or above. You will need to find a way to enable them and make sure to use them separately.

Deliverables

You are expected to demonstrate the network behavior and performance metrics as follows:

1. Observe and plot TCP throughput over the wired and wireless channels considering each of the TCP flavors. Also, plot the congestion window sizes. Plot them all in one figure for comparison. You are expected to explain what is going on and why?

2. Observe and plot packet delay considering each of the TCP flavors. Also, plot the congestion window sizes. Plot them all in one figure for comparison. You are expected to explain what is going on and why?
3. Observe and plot the optimal TCP flavor in terms of throughput and delay. Also, plot the congestion window sizes. Furthermore, you are expected to explain what is going on and why?

Handing In

All of your code should be in a single application directory. It should be reasonably documented (e.g., explain, at a high level, what each function does if it's not very simple). The directory must have a README that describes your algorithm and how it works. Prepare a 5-8 presentation on the output results and submit a tarball of this directory to the instructor.