0.1

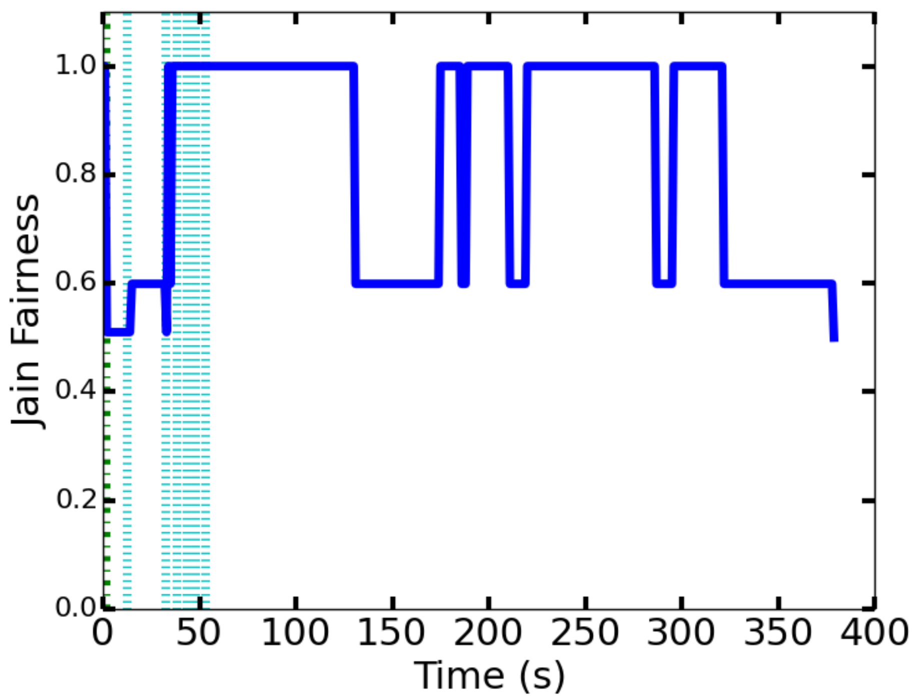

Figure 1 Fairness 0.1s

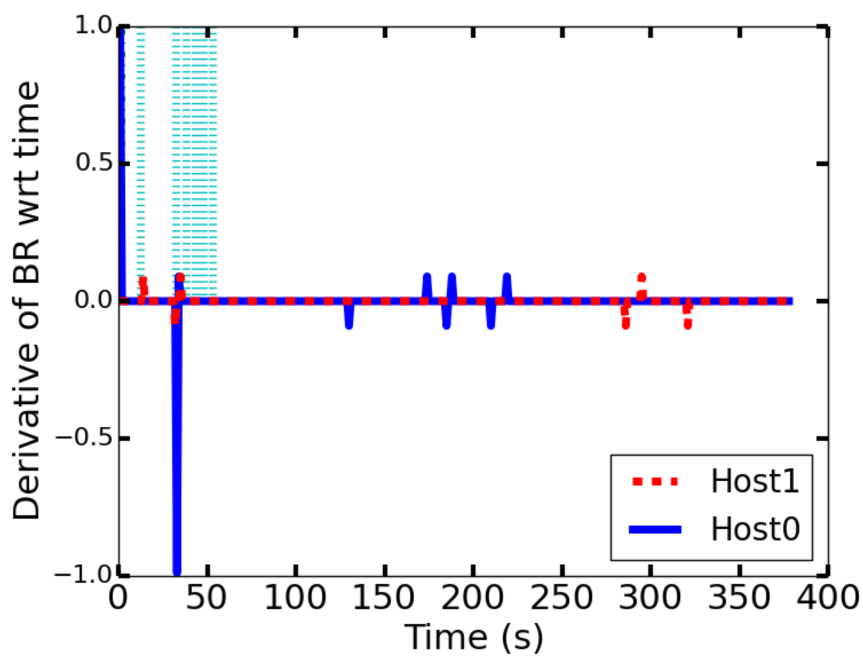

Figure 2 Smoothness 0.1s

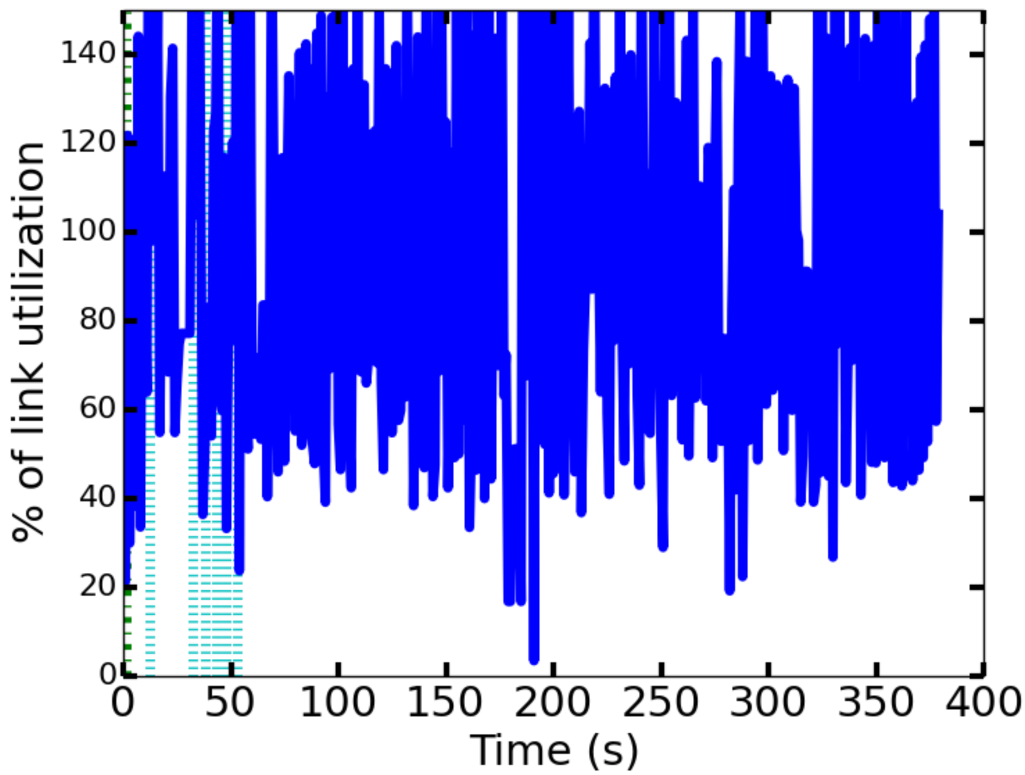

Figure 3 Utilization 0.1s

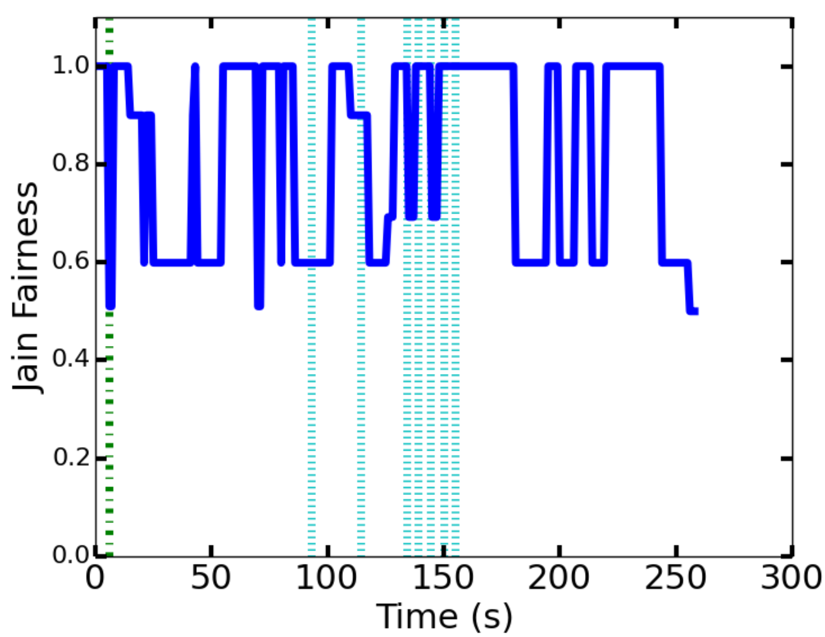

Figure 4 Fairness 0.5

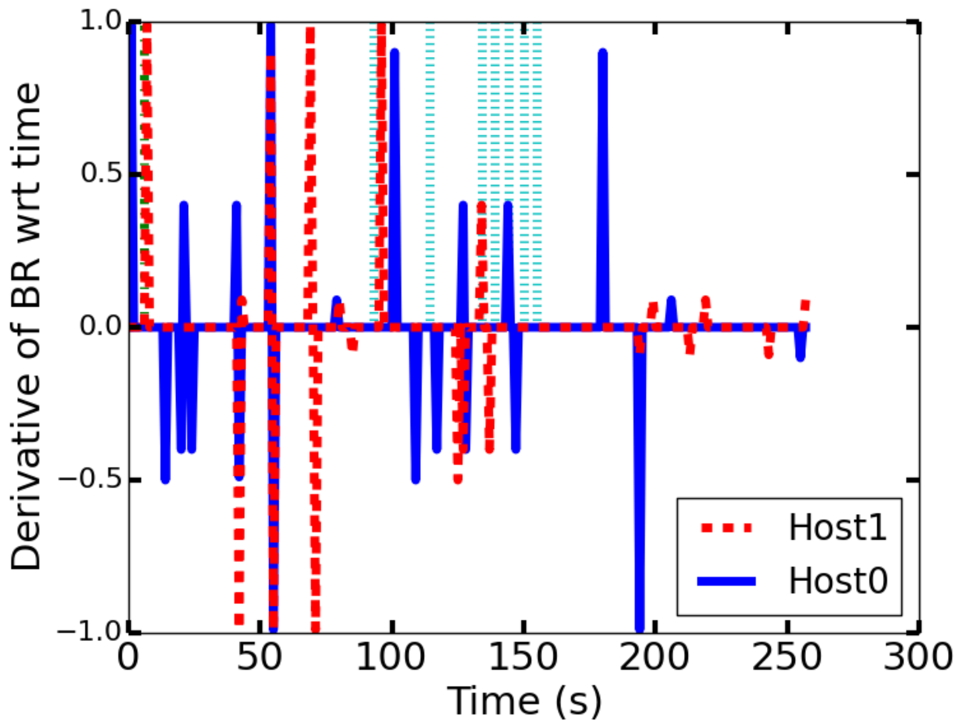

Figure 5 Smoothness 0.5

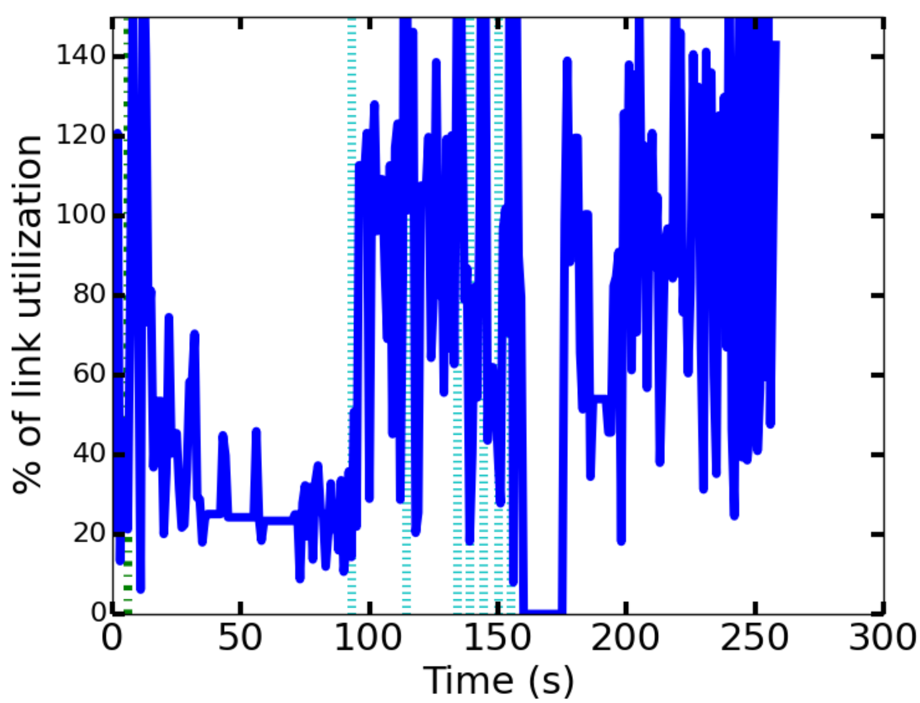

Figure 6 utilization 0.5

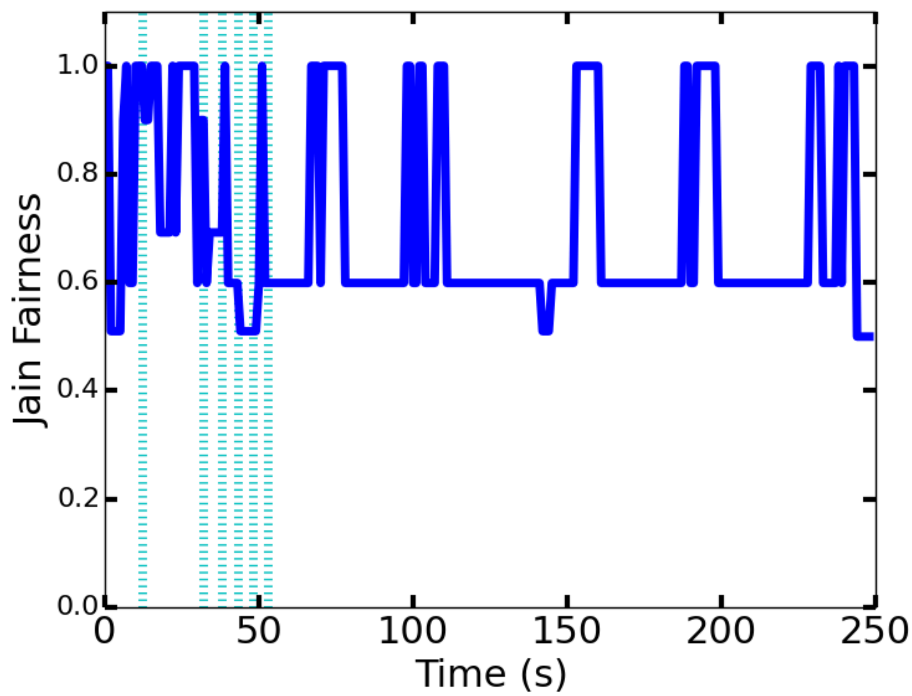

Figure 7 Fairness 0.9

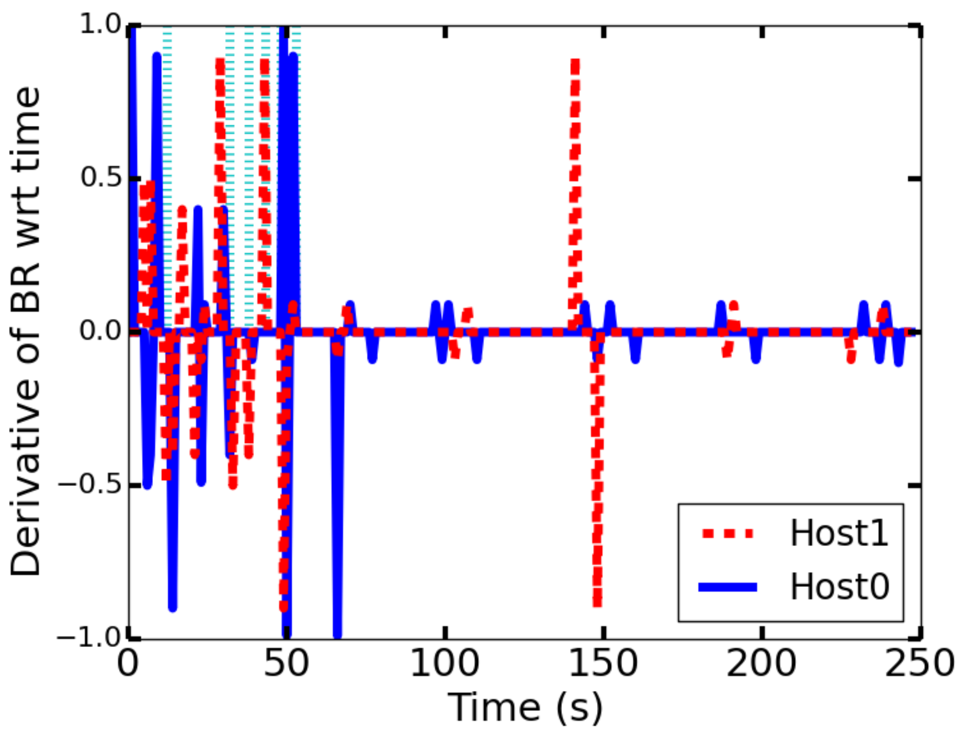

Figure 8 Smoothness 0.9

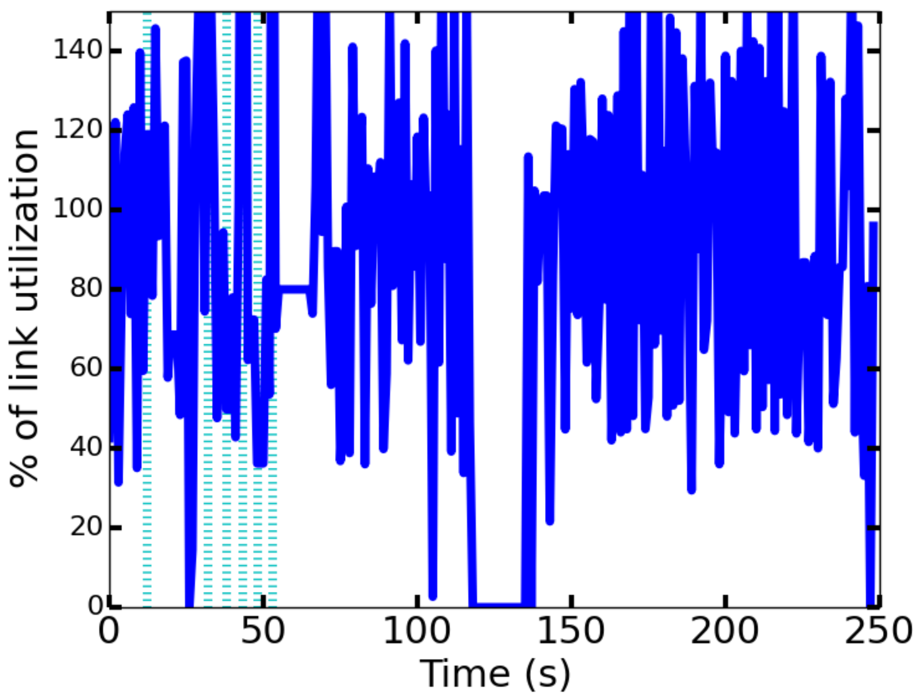

Figure 9 Utilization 0.9

Summary:

The equation to update the throughput is

$$T_{current} = \alpha T_{new} + (1 - \alpha) T_{current}$$

which means if the alpha is larger, the current throughput has less correlation with previous throughput. In extreme case, alpha equals to one, the current throughput is completely decided by the current chunk throughput, which is the least stable.

Because large alpha will cause throughput update quite aggressive, the fairness will be better because every client tries to get a good throughput for themselves. However, the smoothness is not good because of the aggressive update. The utilization also has some deduction because of less smoothness.

Small alpha will have such scenario: If one client dominant the bandwidth, it will take long time for other clients to get bandwidth from this client. So, the fairness is not good. However, the smoothness and utilization will be good.

In our graphs. Alpha = 0.1 has the best smoothness and utilization. Alpha = 0.9 has the best fairness. Alpha = 0.5 is the tradeoff between 0.1 and 0.9.