Video CDN Analysis

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As the graphs demonstrate, as the α increases, the proxies become more aggressive in using the bandwidth when more bandwidth becomes available. This is due to the bitrate's algorithm in generating the exponentially-weighted moving average. With a high α, the most recent estimate for the bandwidth outweighs the previous cumulatived averages. This leads to a very fast recognition in bandwidth changes, leading to an aggressive consumption of more bandwidth. With a low α, however, the previous cumulative averages help smooth out the change in bandwidth detection, and thus less aggressive bandwidth consumption.

1 Fairness

In the fairness graphs, we see the fluctuation from fair to unfair increase as α increases, where at the moments where the links are changed, the fairness changes very abruptly in $\alpha = 0.9$. This is as expected because one of the link was able to detect a change in bandwidth very quickly with a high α and become very aggressive in consuming the new bandwidth, making the usage very unfair.

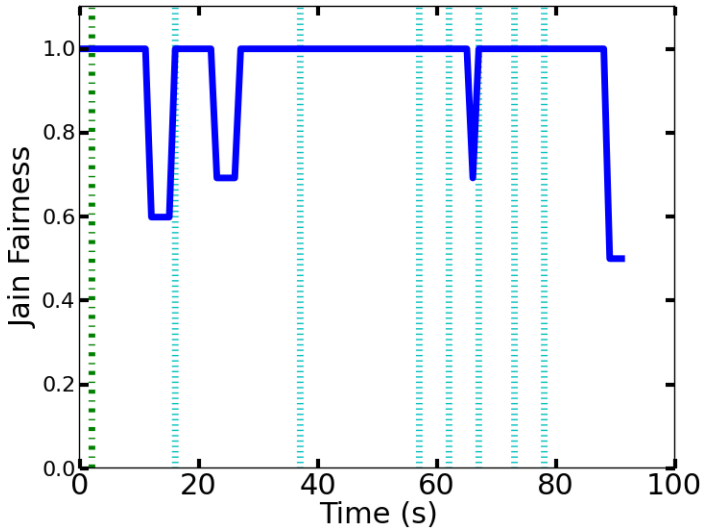

Figure 1: $\alpha = 0.1$

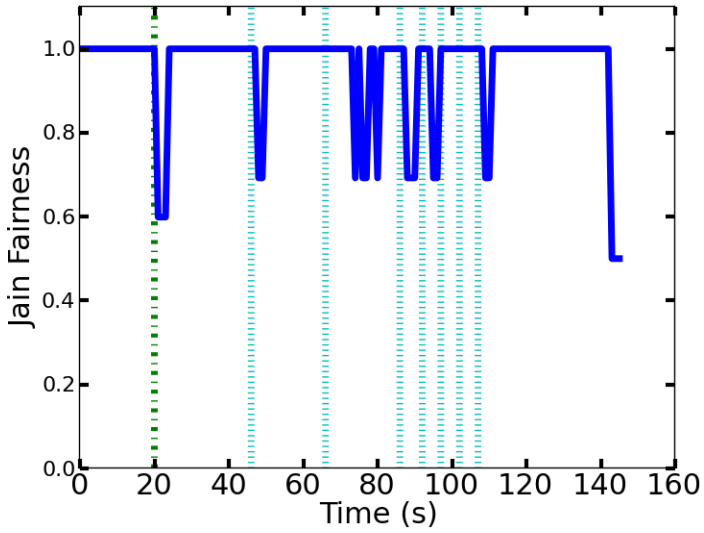

Figure 2: $\alpha = 0.5$

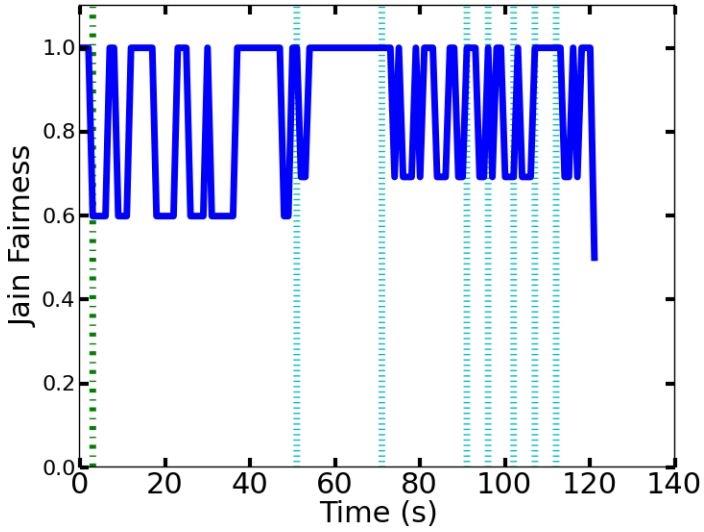

Figure 3: $\alpha = 0.9$

2 Utilization

In the utilization graphs, the percentage changes much more smoothly over the period of time as links are changed with a low α. Even in the change from $\alpha = 0.1$ to $\alpha = 0.5$, the utlization percentage jumps dramatically more when the links are changed. Again, this is due to an aggressive detection of the bandwidth change in using a high α value.

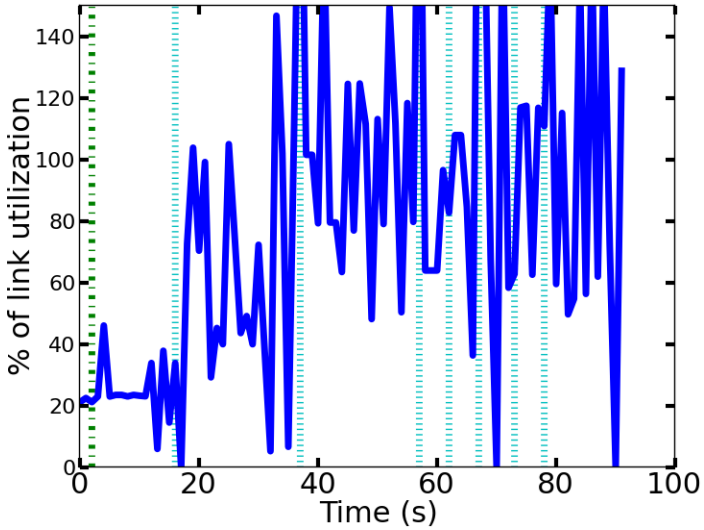

Figure 4: $\alpha = 0.1$

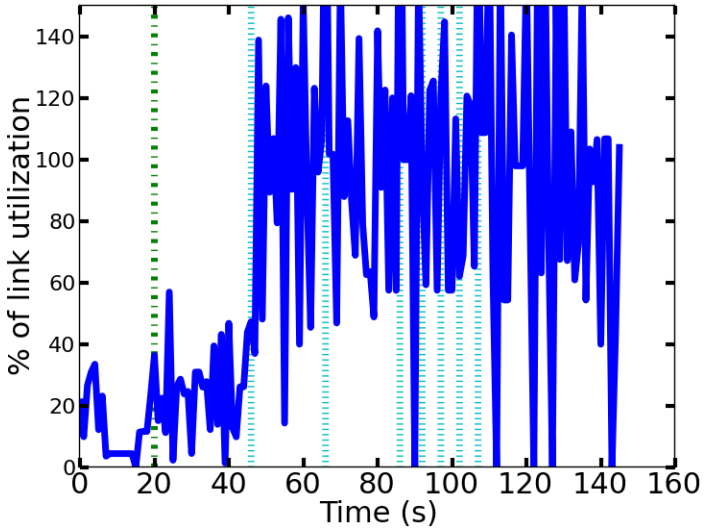

Figure 5: $\alpha = 0.5$

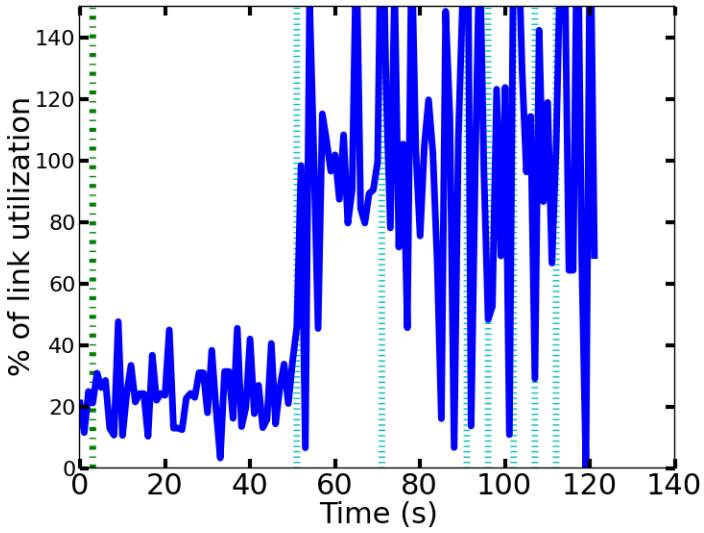

Figure 6: $\alpha = 0.9$

3 Smoothness

The smoothness graphs show most obviously the change in bandwidth detection as α is increased. Since the graph plots the derivatives of the bandwidth, which is the rate of change in bandwidth, the more fluctuation there is in the graph, the more quickly the bandwidth changes across time. This obviously demonstrates the aggressive nature of a high α value in detecting bandwidth changes compared to a low α value.

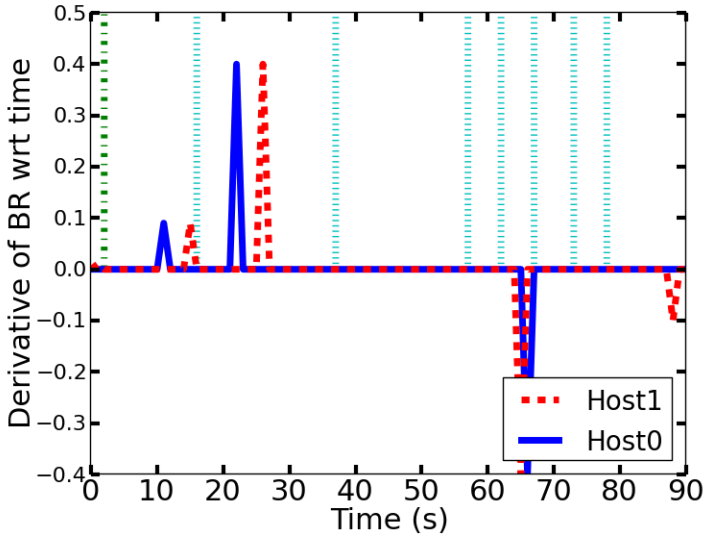

Figure 7: $\alpha = 0.1$

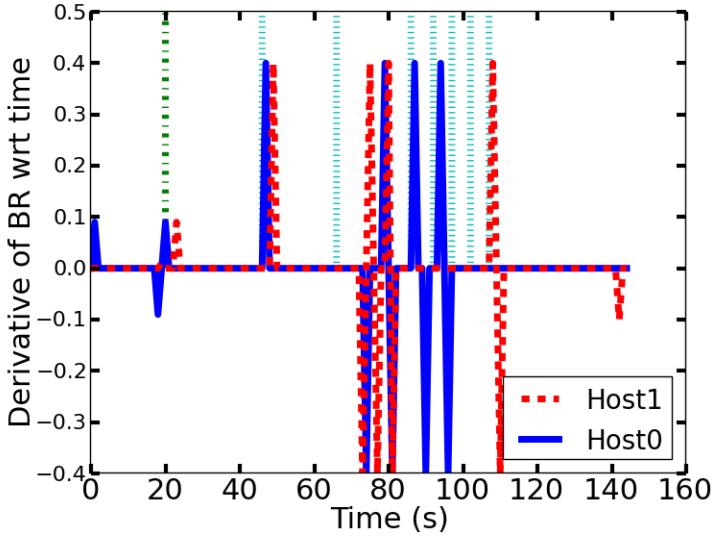

Figure 8: $\alpha = 0.5$

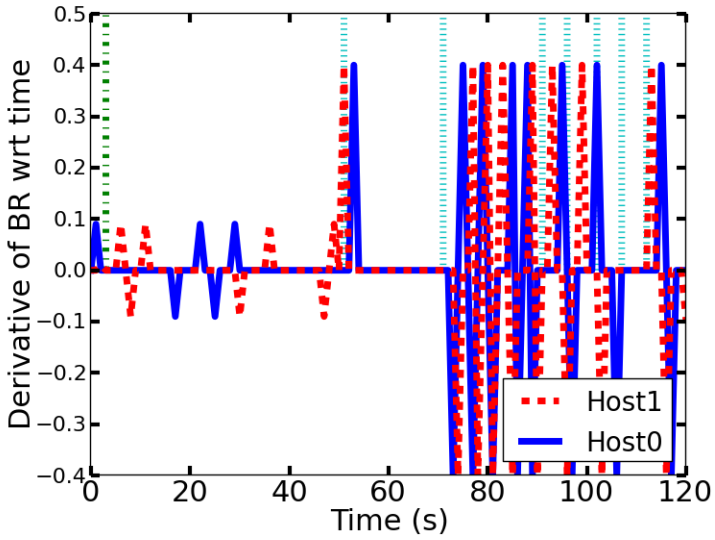

Figure 9: $\alpha = 0.9$