Simulation Project Report

Simulation and Metrology

Master 2 Computer Science for Communication Networks

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In our Project and Report we use response time and queue time interchangeably. We omit the transmission time as it is constant for all the simulations.

Experimentation Process

The steps of our experimentation process are the following:

1. Run several experimentation to find the adequate duration for the simulation of each experimentation, until we reach a relative error $er < 10\%$. Let's denote that duration d

2. For each experimentation we run several simulations of duration $d' = d * 10$ to confirm whether our estimator is converging.

3. Compute for an error $er = 5\%$ or $er = 2\%$ the adequate simulation time s.

4. Run the simulation for each experimentation for a duration s, and store the response time and error.

Results

Our results are plot in figure 1. We observe that for a fixed value of λ_{cbr}, the time spent in the queue increases when value of burstiness b increases.

We also observe that when the value of λ_{cbr} increases, for the same value of burstiness b, the response time decreases. This means that the response time decreases when $\lambda_{on/off}$ decreases.

Explanation and Interpretation

In all our simulation, we fixed the following parameters: packet size, queue size, the overall traffic in the link, bandwidth and latency of the link.These parameters do not impact our experiments.

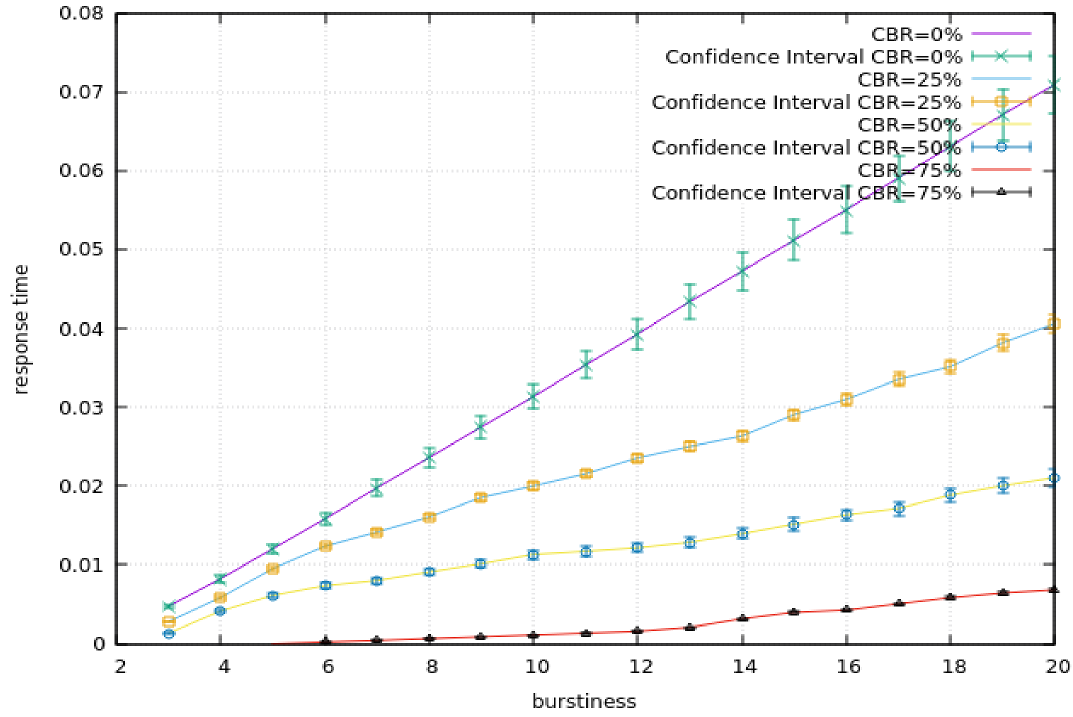

Figure 1: Response time in function of burstiness

For a fixed λ_{cbr}

For $\lambda_{cbr} = 0\%$, the only traffic in the link is the traffic generated by the *on/off source*. This source is modeled with three parameters T_{on} which is fixed, T_{off} and D. When b increases both T_{off} and D increase. More traffic is generated and has to be transmitted during the same period T_{on}. As a result, more packets are generated and enqueued. A packet spends more time in the queue leading to higher response time.

For $\lambda_{cbr} = 25\%, 50\%, 75\%$, the CBR traffic is regular, it means that the traffic generated during the whole simulation is regular. Only the burstiness b impacts the response time. As a result, the explanation given for the case of $\lambda_{cbr} = 0\%$ is valid, for all these cases.

For a fixed burstiness b

T_{on} and T_{off} are fixed when we fix b. When λ_{cbr} increases, $\lambda_{on/off}$ decreases as a result for the same value of b, the peak rate D decreases. Less packets are in the queue and the time spent by a packet in the queue decreases and leads to a better response time.