50.012 Networks (2023 Term 6)

Lab 4

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1. What is the normal time required to download the webpage on h1 from h2?

Time required = 1.0s

2. What was your initial expectation for the congestion window size over time?

I expected the congestion control state to be in slow start, where cwnd = cwnd*2 for each every ACK received.

3. After starting iperf on h1, did you observe something interesting in the ping RTT?

Before iperf: Average ping RTT = 30.948 ms

After iperf: Average ping RTT = 685.513 ms

The ping RTT has increased significantly.

4. After starting iperf on h1, why does the web page take so much longer to download? – Please provide the figures for the first experiment (with qlen 100).

∗ Please comment on what you can see in the figures.

The queue and bandwidth of the router are shared between the webpage and iperf traffic, which results in longer queueing delays as the queue buffer and bandwidth are not dedicated to the webpage anymore, resulting in a longer download time.

Queue occupancy fluctuates between 50 to 100, cwnd increased from 14KB to 44KB before decreasing. We can infer that this is a TCP congestion control protocol, as seen from the AIMD saw-tooth like behaviour.

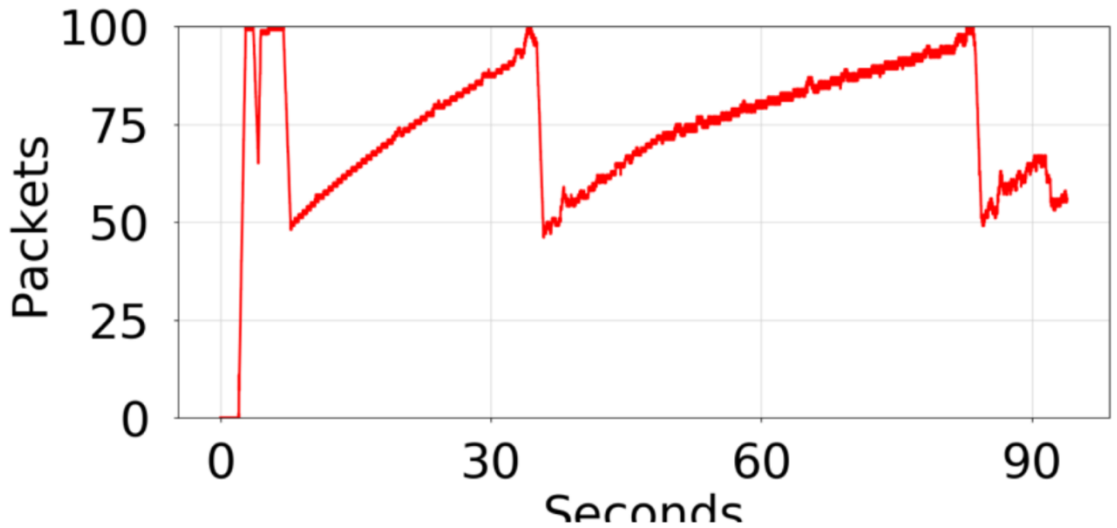

Fig.1 – Queue buffer

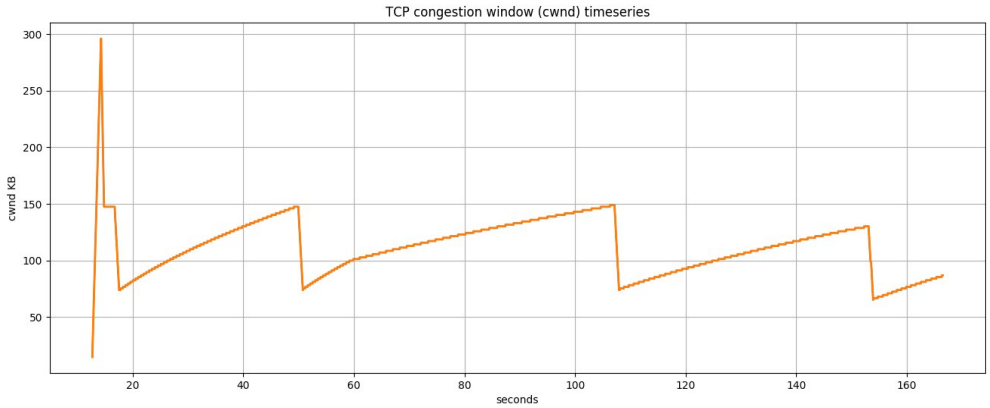

Fig.2 – iperf_cwnd

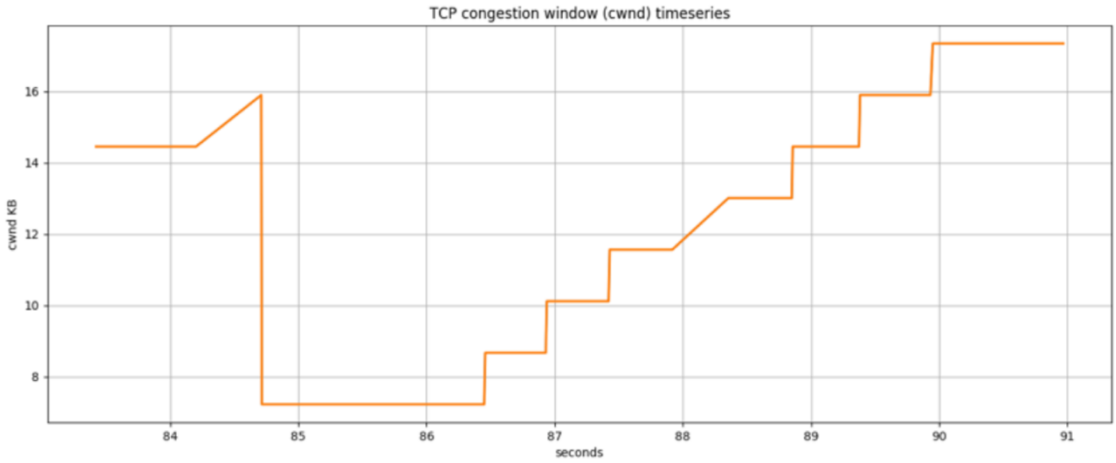

Fig.3 – tcp_cwnd_wget

5. Please provide the figures for the second experiment (with qlen 20).

∗ Please comment on what you can see in the figures and what is different from the previous experiment. Explain the reason behind the difference.

Window get full relatively fast as its size is reduced significantly, which results in more frequent Multiplicative Decrease. This results in higher chances of achieving TCP fairness between two connections. Hence, the iperf plot also looks more choppy.

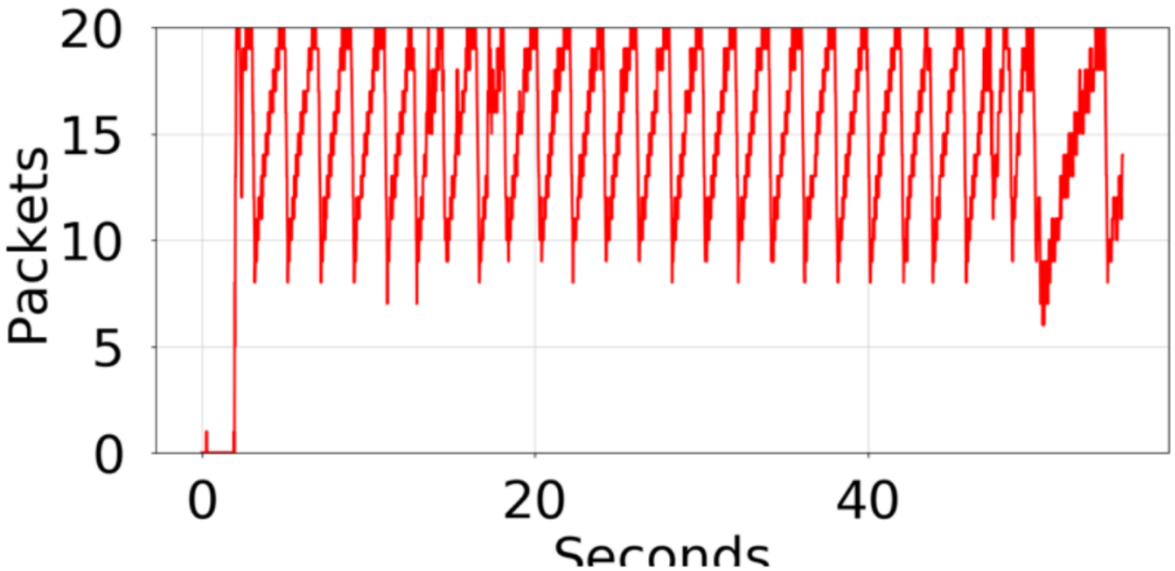

Fig. 4 – Queue buffer

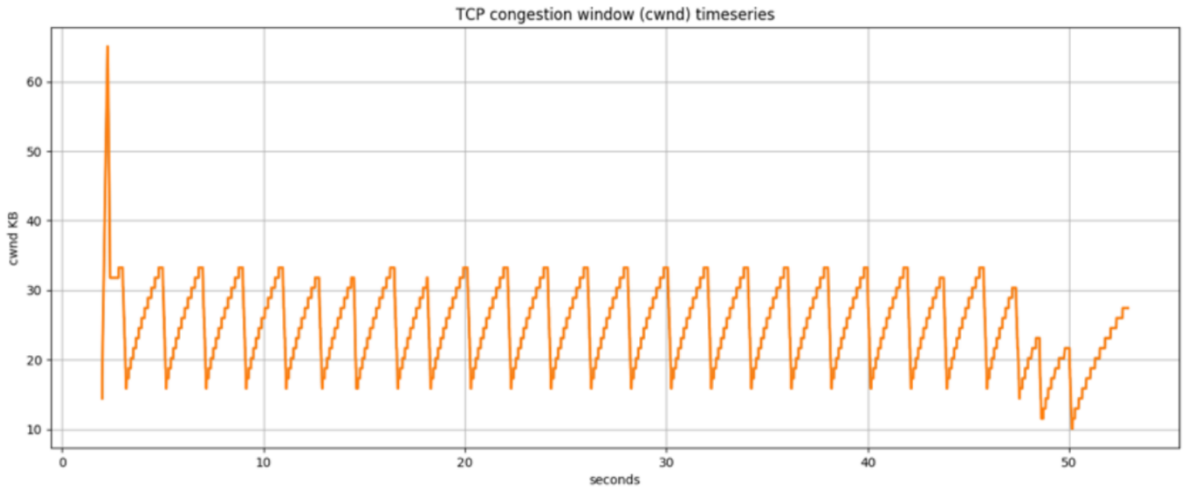

Fig. 5 – iperf_cwnd

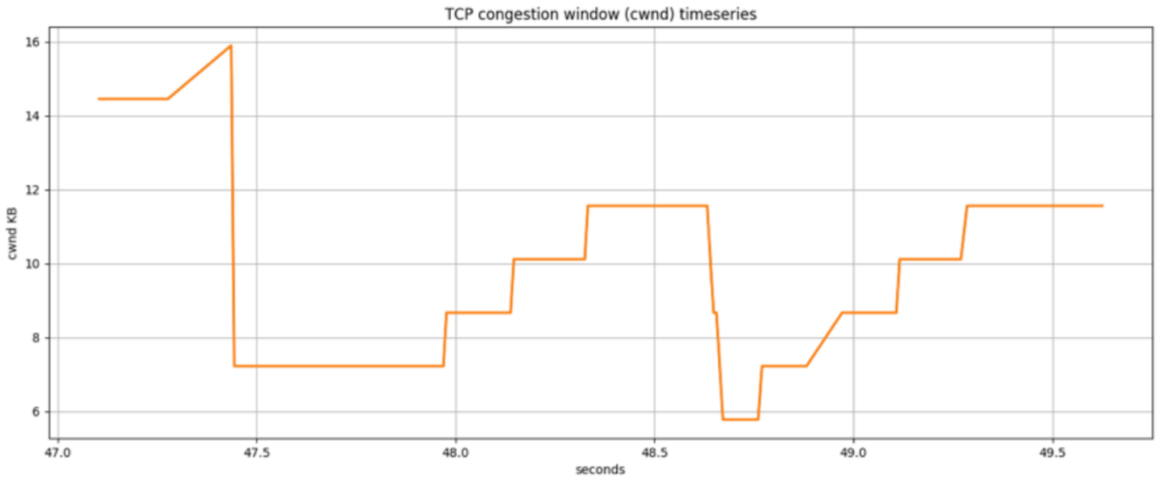

Fig. 6 – tcp_wget_cwnd