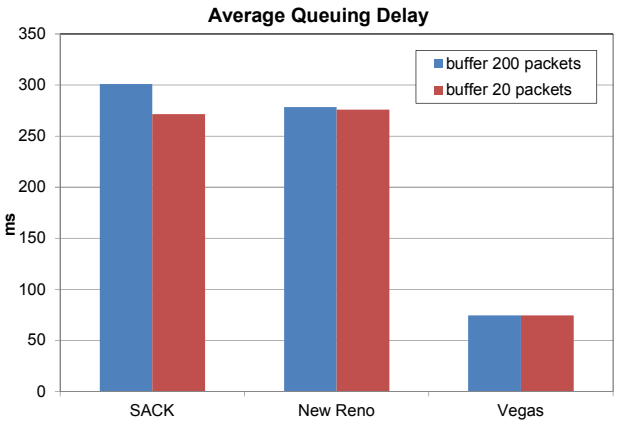

Figure 9. Queuing delay of *WoW* traffic (always using TCP SACK) when using different TCP versions for the background FTP source

For the smaller, 20-packet buffer, there is some packet loss, so both TCP SACK and TCP *New Reno* adapt their sending window accordingly. Interestingly, as they also keep on increasing their rate, they affect the *WoW* flow, which reduces its window (Figs. 6 and 7). TCP *Vegas* (Fig. 8), on the other hand, has a similar behavior to that for the larger, 200-packet buffer: it maintains its window size, which results in smaller delays for the game traffic, as shown in Fig. 9.

V. Conclusions

The results show that TCP *Vegas* is able to maintain a constant rate while competing with the game traffic, since it prevents packet loss by avoiding the increase of the sending window size. Opposite to that, TCP SACK and TCP *New Reno* tend to keep on increasing the window size, thus adding undesired delays to the game traffic. Finally, smaller buffers have been demonstrated to be better for TCP-based MMORPGs, since larger buffers cause higher delays.

As future work, we plan to run simulations with more recent TCP variants (e.g., TCP *Libra*), both for gaming and for background traffic, in order to check its suitability in these scenarios, also taking into account their coexistence with widely deployed TCP variants.

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