This experiment shows us that, even if we strive to put the WAN and the LAN connection on similar conditions, imposing the same RTT and PLR[9], there is always a small bias in favor of the WAN connection. What happens is that, whenever there is a random fluctuation and a cycle without imposed losses ensues, connections run at their native speed, and the WAN connection, which is 10x faster, is able to deliver more bytes.

Indeed, as shown in Figure 6, which plots the outstanding window of the best run of each connection, the WAN outstanding window is free to grow much higher during slow start. Moreover, both connections have a three-second loss-free period, and, in this period, the WAN congestion window increases linearly, while the ADSL one seems to saturate, probably because the pipeline is already full, and the connection is just filling the home router buffer.

4. CONCLUSION

This paper introduces a simple model, based on the Mathis formula, to estimate, at the application level, the packet loss rate (PLR) experienced by a TCP connection. To perform the estimation, the application needs to (i) measure the goodput of a bulk TCP transfer that runs for a fixed amount of time (10 seconds) and (ii) estimate the round trip time (RTT), before or after the transfer. Testbed experiments show that the model predicts the imposed PLR value with a residual (small) dependence on the RTT. Controlled Internet experiments show that the model can reliably predict the PLR imposed to an ADSL connection. The model can detect the injection of losses on a WAN connection as well. However, since the estimation is less precise in this case, our research efforts are currently focused on refining the model for this scenario.

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[9]These are similar conditions since the two connections experience the same RTT. And since, for both connections, the imposed PLR is much higher than the default one, and dominates over it.