Flow control during fast recovery

Example connection

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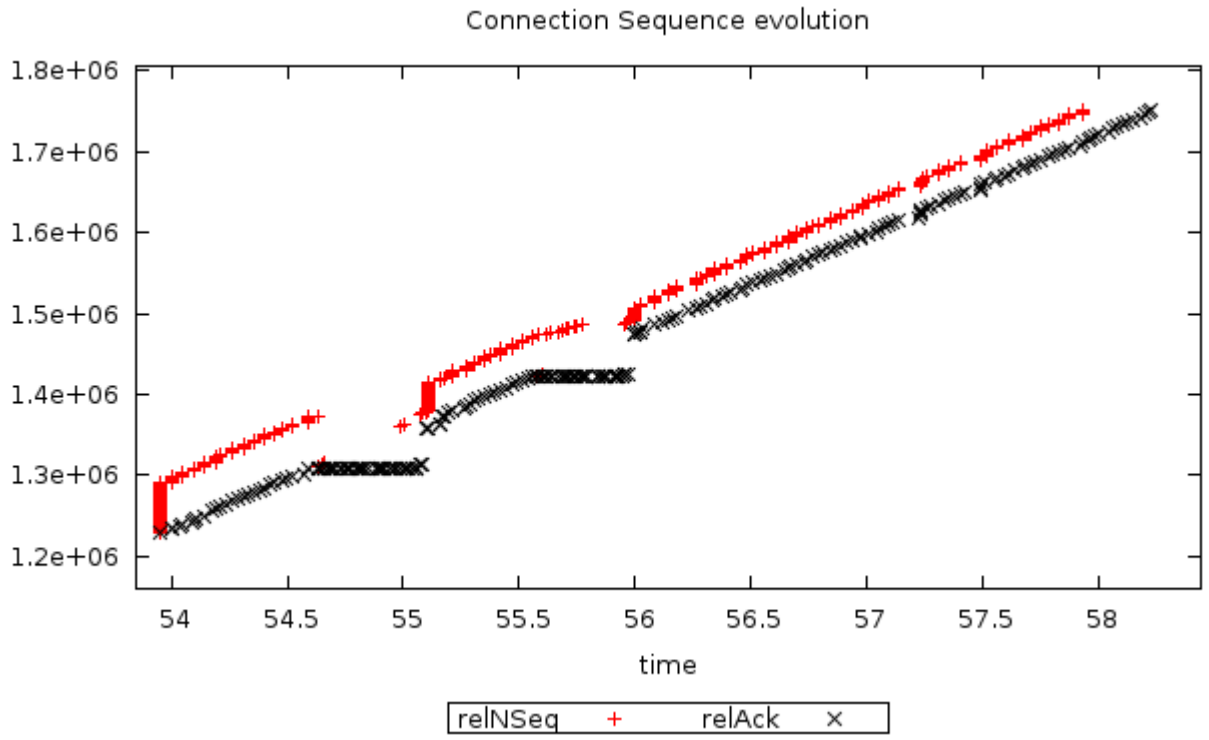
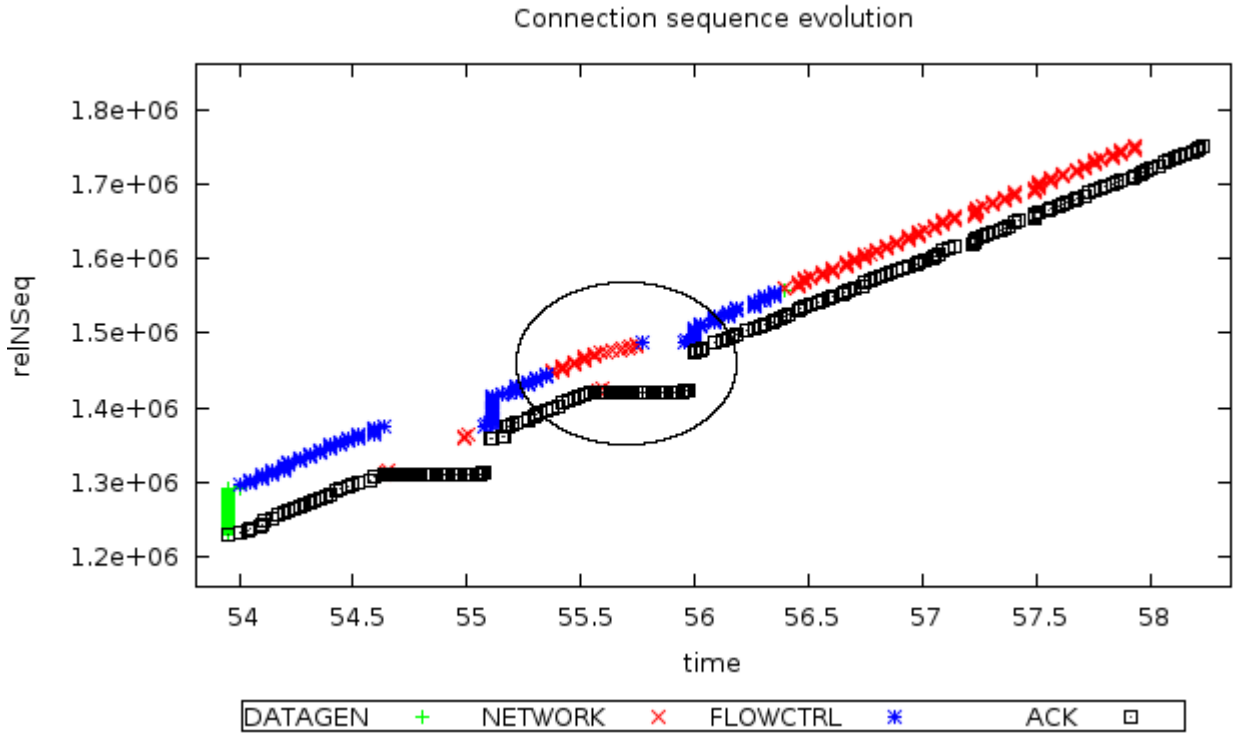
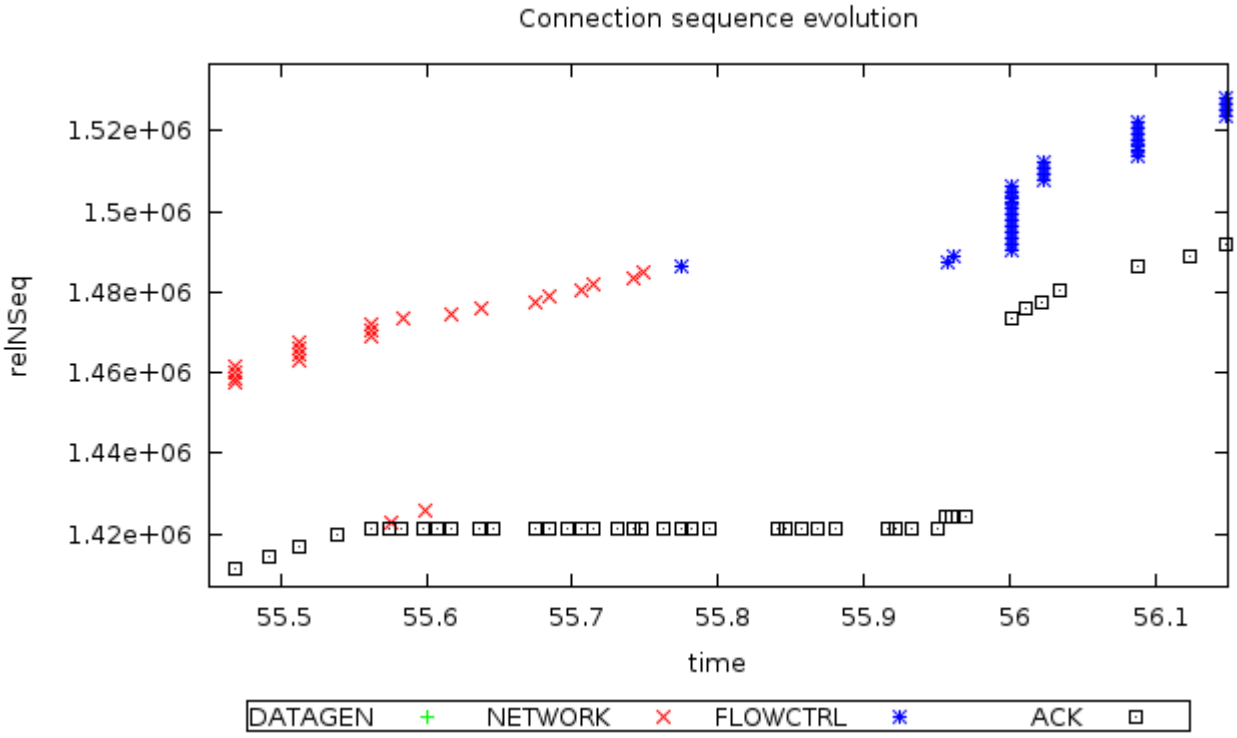
This is an example of a section of a connection where flow control limitation is reached during fast recovery.



The graph was captured very close to the sender, so time reference is almost the same as the sender's. If we analyze it...



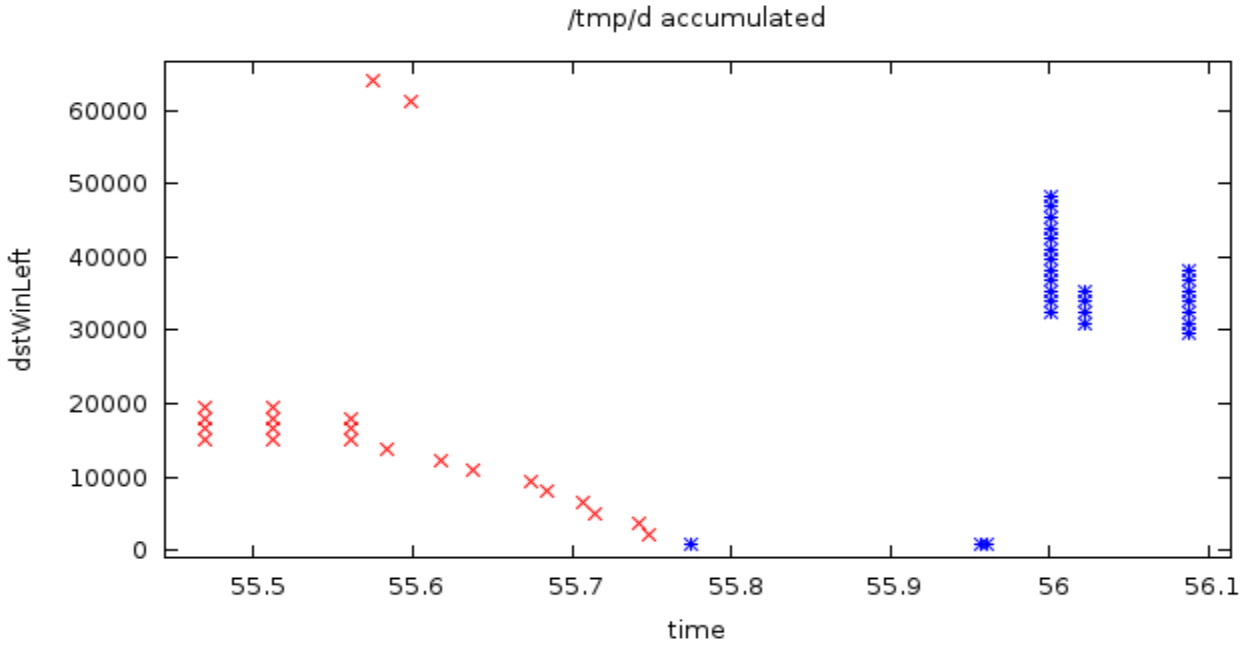
Let's zoom at the flow control region in the circle:



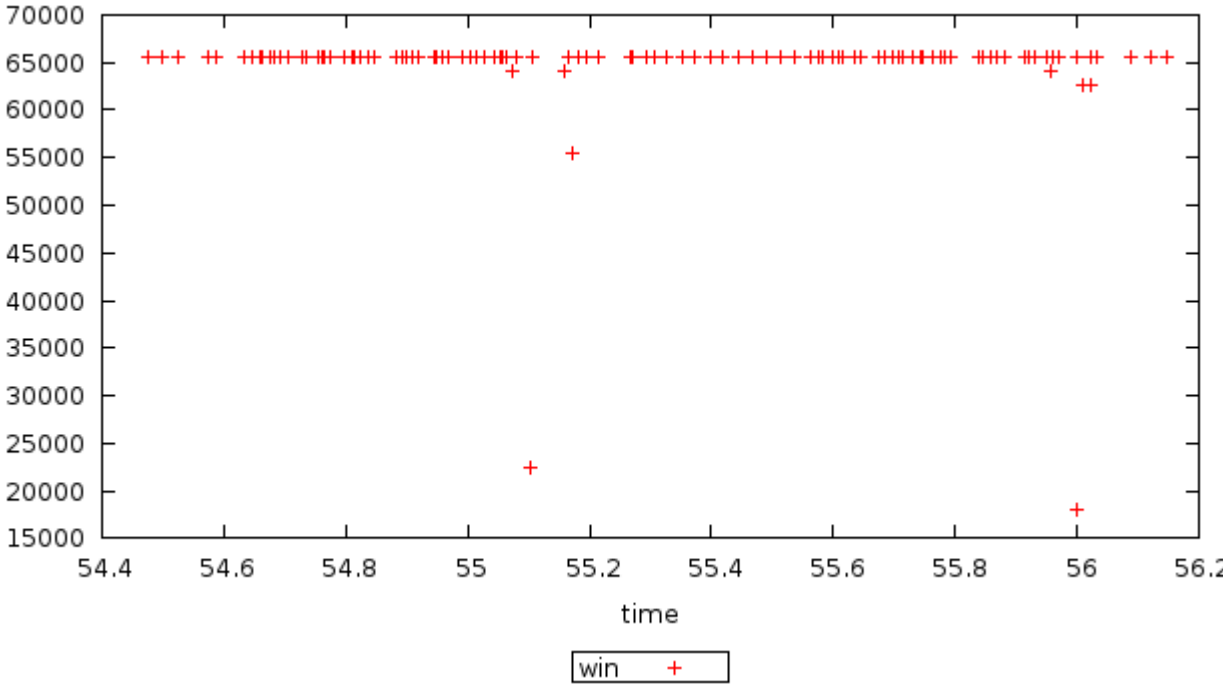
We can see the sequence number growing while the ack sequence remains the same (duplicate acks), until the sequence number stops growing. This is because the sender has filled his perceived space in the receiver window.

When the ack corresponding to the first retransmission arrives at the sender, it can send again as it has a small space in the received window. And when the ack of the filled sequence arrives , the sender can resume normally.

Let's see the evolution of the perceived space at the peer received window:We can see how the perceived space at the destination receiving window falls to zero during this fast recovery, which effectively stops sender



This is because the receiving window stays static during the duplicate ack emission.



The receiver windows scale was 1 so it could have grown its window to 128KB and improve the perfomance during fast recovery.

The pcap dump for the connection can be obtained from:
http://www.palermo.edu/ingenieria/comm/exampleDumpFlowCtrlFastRecovery.pcap

(This connection also entered a limitation by flow control at the first part, but that was not during fast recovery)