GAMING PROTOCOL

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Design

DatagramSockets are unreliable and the packets may arrive out of order. Sender might send a huge burst of packets which could cause huge congestion problem.
Firstly, the packets are divided into equal sized chunks(The last packet could be less than or equal to the maximum size chunk which is 1024). Each packet to be sent consists of a byte array and the corresponding sequence number. The sequence number is used so that the order of packets is maintained at the receiver. There is a congestion window which is used to limit the congestion. The congestion window consists of multiple packets. The initial congestion window size is 2. The packets arrive in the congestion window in order. The protocol is aimed at transferring the packets in the window to the receiver. The sender receives Acks for the packets sent from the window. On receiving the Ack numbers, the sender determines if all the packets in the congestion window have been Ack'ed in order. it checks that the packets are in order and are not lost by checking the ack number of the last packet received. If the last Ack number is less is 1 greater than the last packet sequence number of window, it means that the packets have arrived and there is no loss. The congestion window size is multiplied by 2 in this case. If the new congestion window value is more than the ssThresh(initially defined as 20), the congestion window value is set ssThresh+2. There is a linear increase in the size of congestion window after it passes the ssThresh value(congestion avoidance) and an exponential increase if it is less than ssThresh.

Packet losses are detected if the sender receives two duplicate acknowledgements(2 acks with the same ack number). Once there is a packet loss, the sender retransmits the entire window again which consists of the packet which was lost. Once this is done, the window size is reset back to 2(same like tahoe, slow start) and the ssThresh value is halved.

Thus, the protocol makes sure that the packets are delivered in order to the receiver. Also it makes sure that the packets are retransmitted if lost. The congestion control is maintained by either increasing exponentially the window size, or linearly once it crosses the ssThresh or by setting the window size to 2 if the packet is lost.

The protocol was tested for transferring a size of 5MB in the Cs Lab from one machine to the other.