Analysis_Assignment2

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Performance Comparison

1. Throughput equation in PA2

   The Throughput = the numbers of message received by Application layer of B / Total Time.
   All of the total time are around 50000. The least total time is 47565. The largest total time is 53676. So we can think the total time is a constant number equal to 50000. So the throughput is positive correlation with the number of message received by Application layer of B. The larger the throughput is, the more messages are received by the Application layer of B.

2. Experiment 1 – increment 100

a) Window size 10

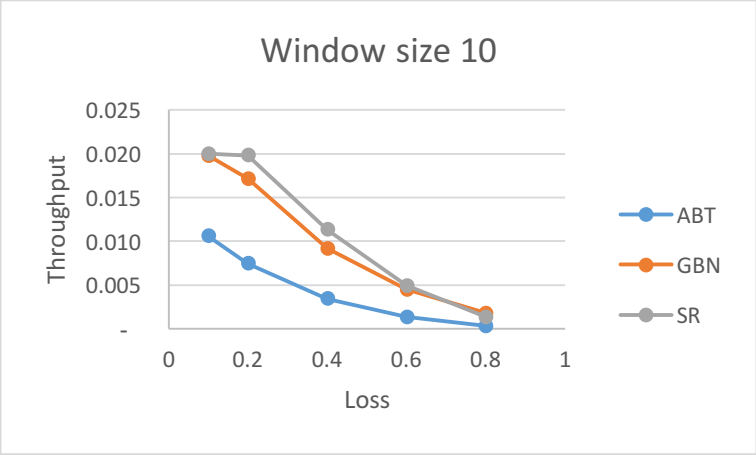

Fig 6.12a

b) Window size 50

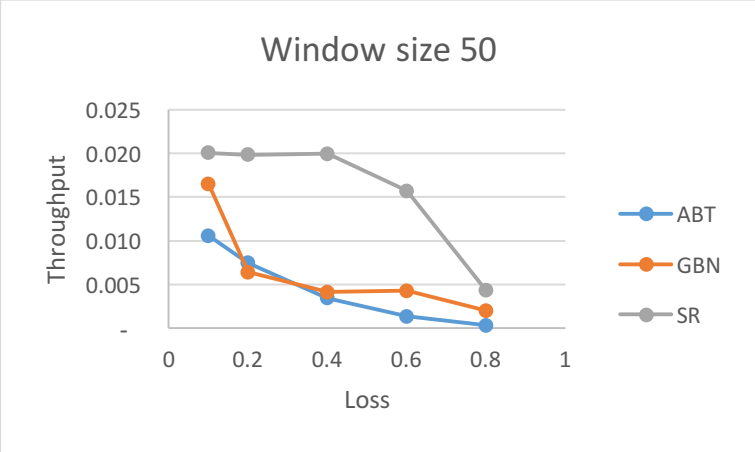

Fig 6.12b

c) Analysis

What variations did you expect for throughput by changing those parameters and why?
Do you agree with your measurements; if not then why?

1. In experiment 1, I expected throughput is negative correlative with the loss rate. Because the throughput is positive correlative with the message received by the layer 5 of B. When the Loss rate increases, less packets will reach B so less message will be received by layer 5. Therefore, the the throughput will decrease. I agree with my measurements. We can see in fig6.12a and fig6.12b when Loss rate increases, all three protocols' throughputs decrease.
2. I expected the SR will have much better performance than GBN and ABT. Because, SR is a selective repeat and pipeline protocol. When timeout it only re-send those packets not been received from receiver B. So compared with ABT, each time SR can send more packets and do not

waste time on waiting. And compared with GBN, SR's receiver can accept all packets which sequence located within the window, thus the opportunity of a packet been accepted by receiver B in SR is much larger than in GBN. Therefore, the throughput of SR will be larger than both ABT and GBN. So I agree with my measurements, we can see in fig6.12a and fig6.12b, in different loss rates all throughputs of SR is larger than those of GBN and ABT.

3. It is very interesting that when the window size is 50. And the loss rate grows from 0.1 to 0.2. The throughput of GBN suddenly decrease a lot. I guess this is because although grow rate only increase 0.1 but it can have huge influence for GBN's receiver. Because GBN's receiver is very demanding which only accepts packet with the smallest sequence number that not been received yet. And each time when sender fails to send that specific packet, it has to resend all unacked packets within the window when timeout happens. unfortunately, this small loss influence that specific packets a lot. We can see the fig6.12c3 below. When Loss rate goes from 0.1 to 0.2, the packets been sent in transport_A increase a lot. But later it become smooth, because A has close the maximum rate it can send out packets in window size 50. There is only small room for sender A to send more packets out. So after loss become 0.2, the increase rate becomes smooth.

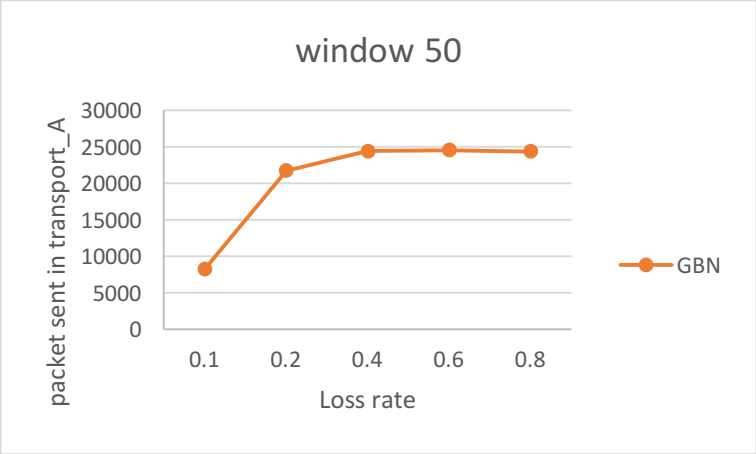

fig6.12c3

3. Experiment 2 – increment 100

a) Loss probability: 0.2

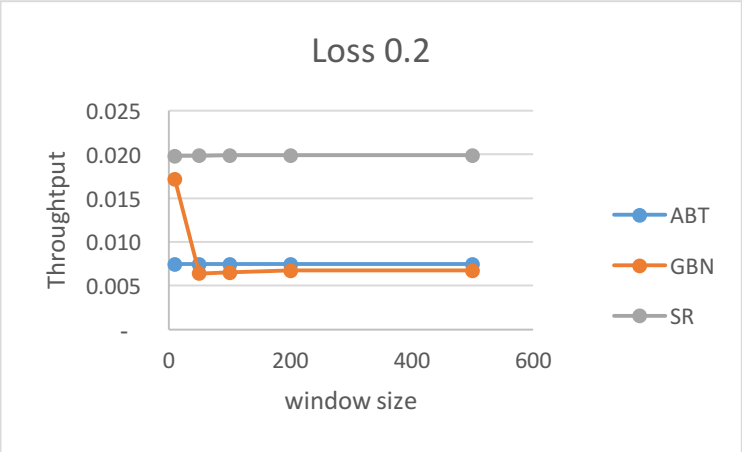

Fig 6.13a

b) Loss probability: 0.5

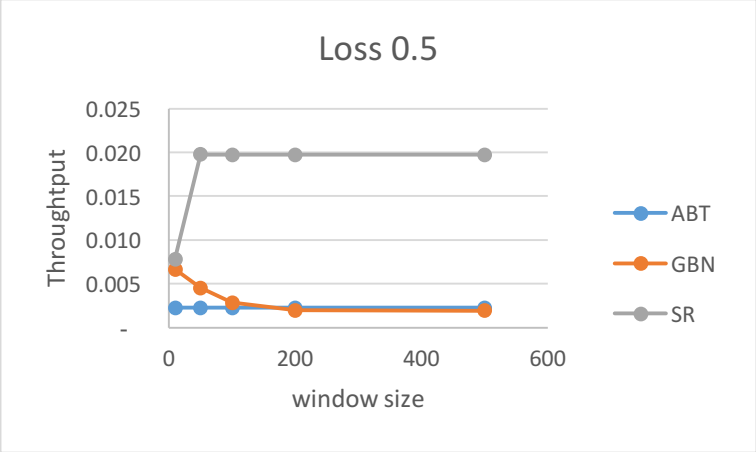

Fig 6.13b

c) Loss probability: 0.8

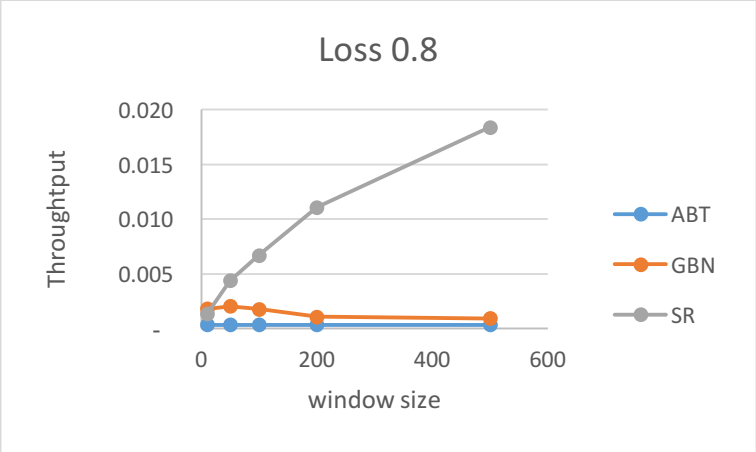

Fig 6.13c

d) Analysis

1. In experiment 2, I expected the window size has positive correlation with the performance of SR but has the negative correlation with the performance of GBN. SR is a selective repeat protocol. SR's receiver keeps a buffer to accept all the packets which sequence numbers is within this window. So when the window size become large, there will be more chance for a packet to be accepted by SR's receiver. But for GBN, it's receiver does not buffer any packet. The GBN's receiver is very demanding which only accepts the packet with the smallest sequence number that not been received. So to enlarge windows size does not help one packet to get more chance to be accept by GBN's receiver but forces the GBN sender send more packets to layer 3 when timeout happened. So the congestion in network will gross when the window size become large in GBN. Therefore, the window size has the negative correlation with the GBN's performance. I agree with my measurements, we can see in all Fig upon, with the window size increase the throughput of SR increase. Especially, for the large Loss rate 0.5 and 0.8, we can see it clearly. And for GBN, all figures show that the throughputs of receiver B decrease when the window size increase. We can see it very clear when loss is 0.2. The GBN's window increase from 10 to 50 makes the throughput decrease from 0.017142 to 0.006397.
2. In experiment 2, I also expected the transport layer of sender A will send more packets when the window size grows. But the packets been sent by GBN will grow more quickly than SR. As the we just said the GBN's receiver is very demanding and the SR's receiver is very hospital. So large window helps packets been accepted in SR but not in GBN. As the result GBN's sender has to send more and more packets when window grows. We can clearly see this trend in fig 6.13d2.

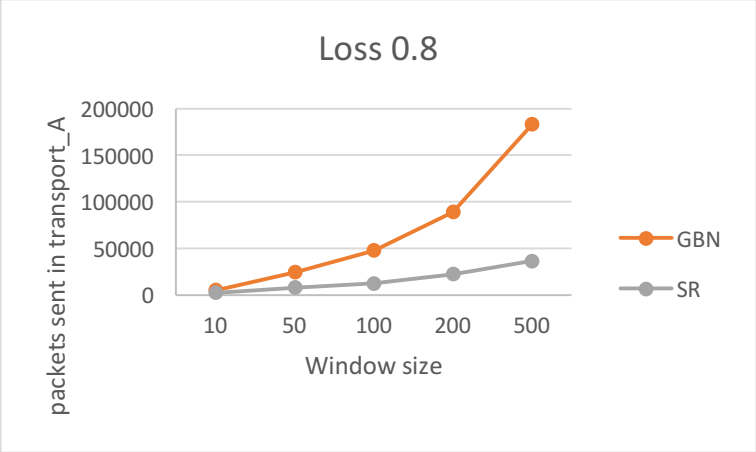
Loss 0.8
packets sent in transport_A
200000
150000
100000
50000
0
10
50
100
200
500
Window size
GBN
SR

fig 6.13d2