CS3205 Assignment 1 - Go Back N and Selective Repeat - Report

E Santhosh Kumar (CS16B107)

1 Go Back N

The following tables 1 and 2 show the average Round Trip Time (RTT)(in ms); retransmission ratio for various configurations of packet length, random drop probabilty and packet generation rate

packet length \ random drop probability	10^{-3}	10^{-5}	10^{-7}
256	5.220 ms; 1.00	5.238 ms; 1.00	5.249 ms; 1.00
1500	5.240 ms; 1.00	5.251 ms; 1.00	5.244 ms; 1.00

Table 1: GBN - packet generation rate = 20, buffer size = 5, window size = 5, no. of packets = 100

packet length \ random drop probability	10^{-3}	10^{-5}	10^{-7}
256	5.106 ms; 1.00	5.210 ms; 1.00	4.989 ms; 1.00
1500	4.916 ms; 1.00	5.144 ms; 1.00	5.226 ms; 1.00

Table 2: GBN - packet generation rate = 300, buffer size = 5, window size = 5, no. of packets = 100

Assumptions

- The sender model maintains only one timer at any given instant, corresponding to the current window. Every time the window shifts, the timer is reset.
- Messages for the GBN model are encoded as $< \textit{sequence no.} >< * >< \textit{data} >$
- The GBN protocol demands that the sender buffer be at least as large as the sender window size
- Maximum sequence number is taken to be 2*(window size) + 1

2 Selective Repeat

The following tables 3 and 4 show the average Round Trip Time (RTT)(in ms); retransmission ratio for various configurations of packet length, random drop probabilty and packet generation rate

packet length \ random drop probability	10^{-3}	10^{-5}	10^{-7}
256	5.578 ms; 1.00	5.470 ms; 1.00	5.560 ms; 1.00
1500	5.551 ms; 1.00	5.461 ms; 1.00	5.523 ms; 1.00

Table 3: SR - packet generation rate = 20, buffer sizes = 5, window sizes = 5, no. of packets = 100

Assumptions

- One spot in the receiver buffer is always left vacant for the packet with immediately next sequence number. Whenever receiver buffer size is less than receiver window size, this condition ensures that the receiver can always forward the packets in order.
- Unlike in GBN, the SR sender can technically work with a buffer smaller than its window size and hence this is permitted.
- We pass the number of bits in the sequence number as a parameter. This is rounded up to a multiple of 8 as sending and receiving data happens in the form of bytes.
- We have assumed that ACKs from the receiver to the sender never get lost. Hence, the receiver window is always at the same position, or ahead of the sender window. Thus, any packet sent by sender that is not the current receiver window has already been received and should be acknowledged.

packet length \ random drop probability	10^{-3}	10^{-5}	10^{-7}
256	5.639 ms; 1.00	5.632 ms; 1.00	4.639 ms; 1.00
1500	5.838 ms; 1.00	5.779 ms; 1.00	5.795 ms; 1.00

Table 4: SR - packet generation rate = 300, buffer sizes = 5, window sizes = 5, no. of packets = 100

3 Observations

- Average RTT values observed for GBN and SR are relatively similar. However, retransmission ratios for SR are significantly better than for GBN. This can be observed increasing the packet drop rate (to say 0.3) and turning off the sender exit conditions given based on the number of failed packet transmissions.
- As expected, the average RTT values are not correlated with drop probability or packet generation rate. However, unlike what is expected, RTT values for packet length = 1500 bytes are not uniformly higher than RTTs for packet length = 256 bytes. Hence, plotting the RTT values for the given parameter specifications is fruitless. One possible explanation for this anomaly could be that the considered values of 256, 1500 bytes are too small to considerably affect the RTT.
- As expected, the retransmission ratio increases as random drop probability increases. This trend is more clear when considering larger drop probabilities.
- Table 5 and figure 1 show how the retransmission ratio in SR protocol varies with the relative sizes of the sender and receiver buffers with respect to the window size.
  - For receiver buffer sizes lower than the window size, the retransmission ratio increases as the buffer size decreases. Receiver buffer size = 1 is essentially GBN.
  - For receiver buffer sizes more than the window size, the extra space is unusable and hence the retransmission ratio remains the same.
  - For receiver buffer sizes lower than the window size, the retransmission ratio increases significantly as sender buffer size increases (till it reaches window size).

receiver buffer size \ sender buffer size	**3**	**5**	**7**
1	1.83	2.98	3.24
3	1.13	1.20	1.20
5	1.08	1.09	1.09
7	1.07	1.07	1.08

Table 5: retransmission ratio for SR protocol, window sizes = 5, random drop rate = 0.1

Learnings from the Assignment

- socket programming
- complexities and corner cases involved in coding the GBN and SR protocols
- effects of window and buffer sizes
- practically observed issues that arise due to poor choices of maximum sequence numbers

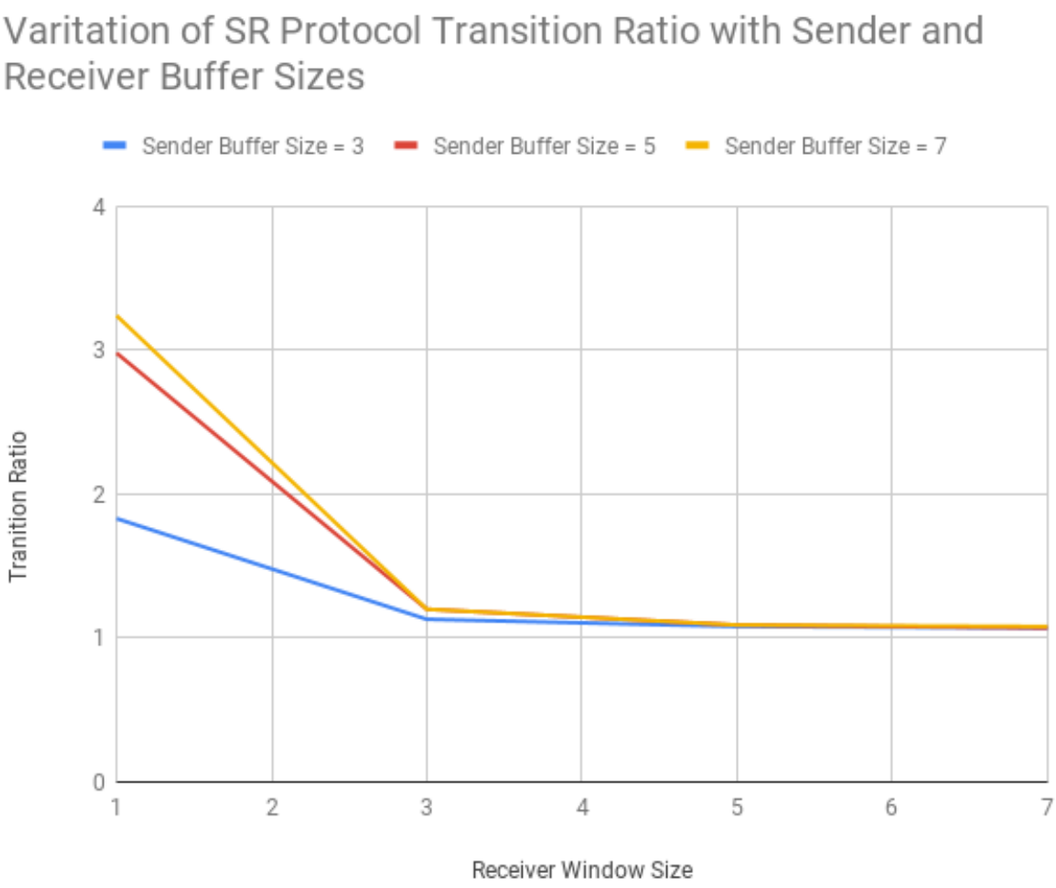

Figure 1: window sizes = 5, random drop rate = 0.1