



Assignment 8 -

Write a program to simulate Go Back N and Selective Repeat Modes of Sliding Window Protocol.

1. What is flow control?

Flow control is basically a technique that gives permission to two stations that are working and processing at different speeds to just communicate with one another. Flow control in data link layer simply restricts or coordinates the number of frames ~~that~~ or the amount of data that sender can send before it ~~receives~~ a waits for an acknowledgement from the receiver. This mechanism makes the sender wait for an acknowledgement before sending the next data.

2. Compare stop and wait & sliding window flow control.

Stop and Wait Protocol

a. Sender sends one frame and waits for an acknowledgement from the receiver side.

b. Efficiency is worse.

Sliding Window Protocol

Sender sends more than one frame to the receiver side and re-transmits the frame(s) which are damaged or suspected. Efficiency of sliding window protocol is better.

Stop and Wait Protocol

c. Sender window size is 1.

d. Receiver window size is 1.

e. Stop and wait protocol is half duplex.

f. Efficiency of stop and wait protocol is $\left(\frac{1}{1+2*a} \right)$

here $a \rightarrow$ Ratio of propagation delay vs transmission delay

Sliding Window Protocol

Sender window size is N .

Receiver window size may be 1 or n .

Sliding window protocol is full duplex.

Efficiency of sliding window protocol is

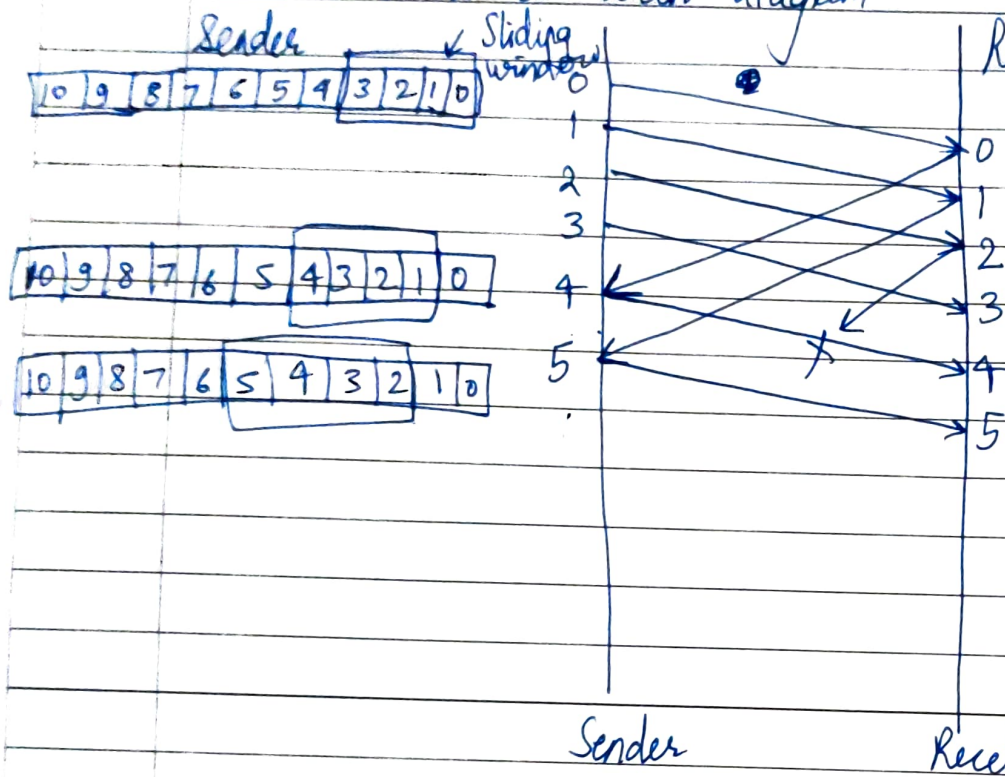
$\left(\frac{N}{1+2*a} \right)$ $N \rightarrow$ no. of window frames

a is ratio of propagation delay vs transmission delay

3. Describe Go-Back-N protocol working with diagrams.

In Go-Back-N protocol, N is the size of the window (sender). In the example given, the sender window size is $N=3$, so 3 frames can be sent at a time before expecting any acknowledgement from the receiver. If the acknowledgement of a frame is received the window slides, else all frames in the window are resent.

Sender



Acknowledgement
of 2 gets lost
(or it
could be
that frame 2
was not
received by the
receiver)

Here sender window size = 4 and 11 frames are to be sent from sender to receiver. Frames are numbered as 0, 1, 2, 3, 0, 1, 2, 3, 0, 1, 2 but here for the purpose of understanding they are numbered from 0 to 10. The sender will wait for a certain time, if it does not receive the acknowledgement in time then it has to retransmit. So now the sender goes back to 2. 2 is the starting frame in the current window. From 2, all the frames in the current window i.e. 2, 3, 4 and 5 are retransmitted.

9. Write program logic of Go Back N.

Sender -

1. Set $\text{base} = 0$, $\text{nextseqnum} = 0$
2. If $\text{nextseqnum} < \text{base} + N$ then packet with sequence no = nextseqnum is sent.
3. nextseqnum is incremented by 1.
4. If ack n is received then $\text{base} = n + 1$.
5. If base is equal to nextseqnum then the timer is stopped else it is started.
6. In case there is a timeout, the timer is restarted.

Packet with $\text{seqnum} = \text{base}$ is sent, next packet with $\text{seqnum} = \text{base} + 1$ is sent and so on till packet with $\text{seqnum} = (\text{nextseqnum} - 1)$ is sent.

7. The process keeps repeating till the connection is terminated.

Receiver -

1. Set $\text{seqnum} = 0$
2. If packet is received then -
 - If the packet is not corrupted, and its sequence num = nextseqnum then the data is delivered to the upper layer.
 - Acknowledgment of nextseqnum is sent.
 - nextseqnum is incremented by 1
3. If the packet is corrupted or out of order, it is dropped. Ack of $\text{nextseqnum} - 1$ is sent.
4. Else the program ends.
5. Steps 2 to 3 repeat till the connection is not terminated.



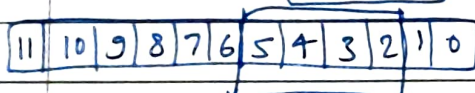
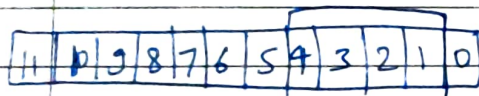
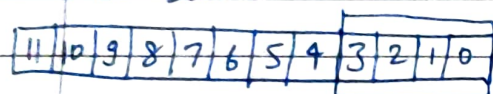
STUDENT'S ROLL NO. :

3330

5. Describe selective repeat protocol, ^{working} with diagram.

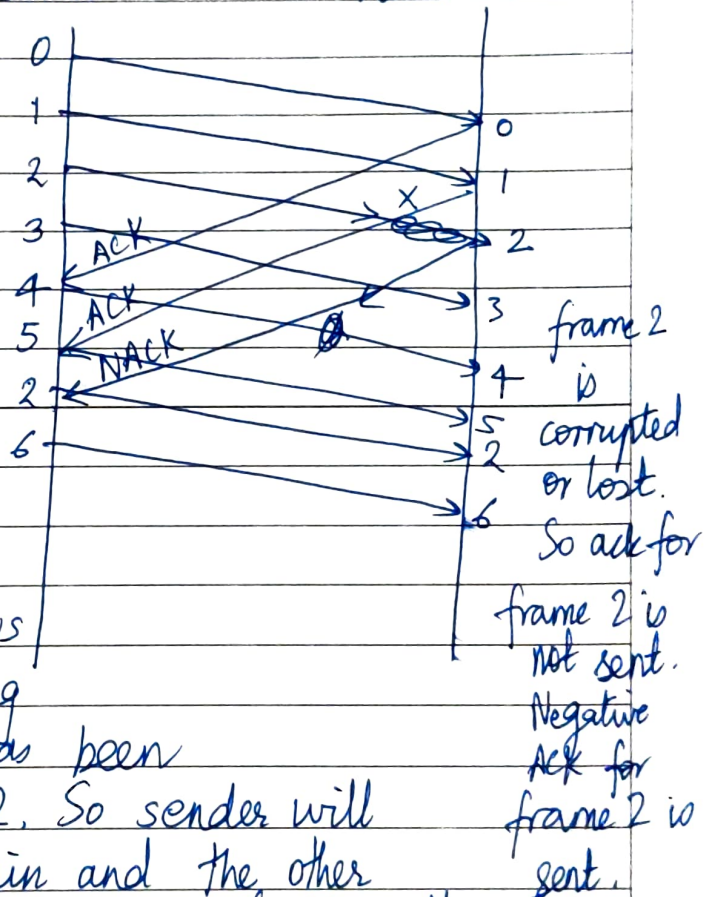
In Selective repeat protocol, only the erroneous/lost frames are retransmitted while the correct frames are received and buffered.

Here window size = 4 and 11 frames are to be sent.



Sender

Receiver



Here the sender will not send frames 4 and 5 again. It knows that frame 2 is missing as a negative ACK has been sent for frame 2. So sender will retransmit frame 2 again and the other frames will be transmitted as usual. Here the Sender window size does not play a significant role as the sender is going to retransmit the frames for which negative ACK has been received.

Selective repeat protocol has fewer retransmissions as compared to Go Back N-ARQ.

6. Write program logic of Selective Repeat protocol.

- Set the sender window size (W_s) = Receiver Window size (W_r)
- Sender can transmit new packets as long as their sequence no. is within window of all unacknowledged packets.
- Sender retransmits unacknowledged packets after a timeout or upon a negative ACK.
- Receiver sends ACKs for all the correct packets. It stores all the correct packets until they can be delivered to the higher layer in correct order.