Final design of project1

Data Structure of Receiver

Integer ACK , ,tracking how many packets we have already received.
2d array buffer Window, index starts from ACK+2 to ACK+Windowsize+1.
Integer buffer_size , tracking how many packets inside our window
Integer array buffer , tracking in which position we have buffer.
A timer for ACK+1 , timer for the expected packets

The Receiver simply gets packets through socket and write the data into the file.

Loss case recovery algorithm: when we get unexpected packet, whose packet index is above ACK+1, we will store it into buffer, and send Nack , asking for the missing packet.
However, we will limit the number of time of resending, which means we will not ask for the same ACK more than three times. In case of extreme case, I made a timer for ACK+1, if time out, we also resend Nack for ACK+1.

Multiple sender case: Firstly, when the receiver gets incoming packet, it will check whether it is busy or not. If it is free, then receiver will check the index of packet, making sure it is not delayed packets. If the index is zero, receiver will keep the info of packet, typically the address, and the packet should include the file name and receiver will open the file to write.
If the receiver is not free, it will check address of packet. If the address does not match the current address, the receiver will send ACK =-1 to sender, if it does match, then receiver will go to the normal process.

Data Structure of Sender

2d array buffer Window , index starts from head to tail.

First ,The Sender will initialize the window by reading window size file and send the whole window to receiver. Then wait receiver's response. If received ACK is less than head -1, this might be a delayed one, if they are equal, we check Nack and resend them. If received Ack is great than head then we shift the window. When we reach the end of file, sender will send an packet with index= -1, indicating this is the end of transmission.

Multiple sender case: before body part, sender will ask permission to write, if receiver says no, receiving ACK = -1, sender will keep asking every second until receiver give the permission. Within the permission, file name will be included.

Time out case, sender will resend everything in the window.