

Additional problems:

A1: Assuming that the largest sequence number for GBN is 15, explain why the transmission window size cannot be chosen to be 16.

Solution: The window size must be less than the largest sequence number. In the case where the largest sequence number are 15, and window size 16, if all the ACKs were lost for the first 16 frames, the receiver, not knowing that they are lost, will set R_{next} to zero. On the other hand, the sender, which did not receive the ACKs, will resend starting with frame zero from the previous sequence. The receiver R_{next} is zero (referring to the first frame in the new sequence). The sender's frame sequence number is zero, referring to the first frame of the previous sequence. The receiver unknowingly will think this is a frame in the new sequence and will pass it to the high layer (network layer), a duplicate will occur, hence the protocol operates incorrectly. For more details, consult section 5.2 about the GBN protocol.

A2: For the stop-and-wait protocol, under perfect channel condition (i.e., there is no channel error), what would happen if the acknowledgment is not used by the receiver while only negative acknowledgment is used? What would happen to GBN under the same scenario?

Solution: For stop-and-wait, any packet will have to be transmitted twice, the NAK is used to indicate the ack for previous packet reception: the receiver checks the sequence number expected and find the frame is not expected, will drops the received packet and ask for the correct one, then transmitter will transmit the next one. The same thing occurs for GBN. The only difference is that a packet may have to be sent more than twice depending on the window size.