SOLUTION SDL specification of the go-back-N protocol

In order to more easily model concurrency at the transmitter, we will model the transmitter as 3 concurrent processes.

1. The transmit process. This process gets the next message when the window size allows, and transmits the message.
2. The acknowledgement processor, which receives acks from the receiver and advances the window.
3. The timeout processor. When a timeout occurs the process backs up the next message transmitted to the next expected acknowledgement.

Definitions:

• $W =$ window size, number of unacknowledged messages that may be outstanding.
• $m_a =$ number of next message that will be acknowledged.
• $m_x =$ number of next message to transmit.
• $m_e =$ number of next message expected by the receiver
Timeout

- get msg: \( m_a \)
- msg: \( m_a \)
- \( m_x = m_a + 1 \)
- set timeout

Xmit Msg

- \( m_x < m_a + W \)
- get msg: \( m_x \)
- msg: \( m_x \)
- \( m_x++ \)
- timeout set
- no
- set timeout
- yes

Receiver

- receive
- msg: b
- \( b \leq m_x \)
- no
- yes
- \( b = m_x \)
- yes
- accept msg: \( m_x \)
- \( m_x++ \)
- yes

Rcv Ack

- receive
- ack: a
- no
- \( a > m_a \)
- yes
- \( m_a = a \)
- set timeout
- no
- \( m_a = m_x \)
- yes
- reset timeout
- no