GBN

* ES -> event, time, flag, sequence number
* ES.event -> time out, ack
* Send() -> same as abp except change the counter to be % (N+1)
  + Forward channel
  + Receiver
  + Reverse channel
* Buffer of size N

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| --- | --- | --- | --- | --- |
| * SN [1] * Time [1] | * SN [2] * Time [2] | * SN [3] * Time [3] | * SN [4] * Time [4] | * SN [5] * Time [5] |

* Time [1] = 5ms
* Time [2] = 10ms -> increase ES.time (since ES.time is greater)
* If ACK is received for T[1], increase the location counter (shift left)
* Flow chart
  + Initialization()
    - Current time = 0
    - Location Counter = 1
    - SN[1] = 0
    - Next Expected Frame = 1
    - Next Expected ACK [1::N] = NULL
  + Sender()
    - 10::While Buffer has not sent frames // counter > (N + 1)
      * Current time = current time + Packet\_Length / cap
      * Set T[counter] = tc //trans. Time
      * Next\_expected\_ack[counter] = (SN[counter]+1)%(N+1)
      * If this is the oldest frame in the buffer
        + Insert time out event in ES at time = T[counter]+delta
      * Send() frame with SN[counter], T[counter]
      * Read the time of the first event in ES
      * If event time < T[counter] && event = time\_out
        + Purge old time out
        + Set counter = 1
        + GoTo 10
      * If event time < T[counter] && event = Ack error\_free && RN is in Next\_expected\_ack[1::N]
        + P = SN[1]
        + Shift Left for SN and T and counter by (RN–P)%(N+1)
        + Purge old time out
        + Insert time out at T[1] + delta
      * Counter = counter + 1
      * SN[counter] = (SN[counter - 1]+1)%(N+1)
  + Event\_Processor()
    - While ES is not empty
      * Read the first event in ES
      * Tc = event time
      * If event = time\_out
        + Counter = 1
        + Purge old time out
        + Sender() to re-transmit all the frames
      * Else if event = ack with error-free and RN is in Next\_Expected\_Ack[1::N]
        + P = SN[1]
        + Shift Left for SN, T, Counter by (RN-P)%(N+1)
        + Purge old time out
        + Insert time out in ES at T[1] + delta
        + Counter++
        + SN[counter] = (sn[counter-1]+1)%(N+1)
        + Call Sender()