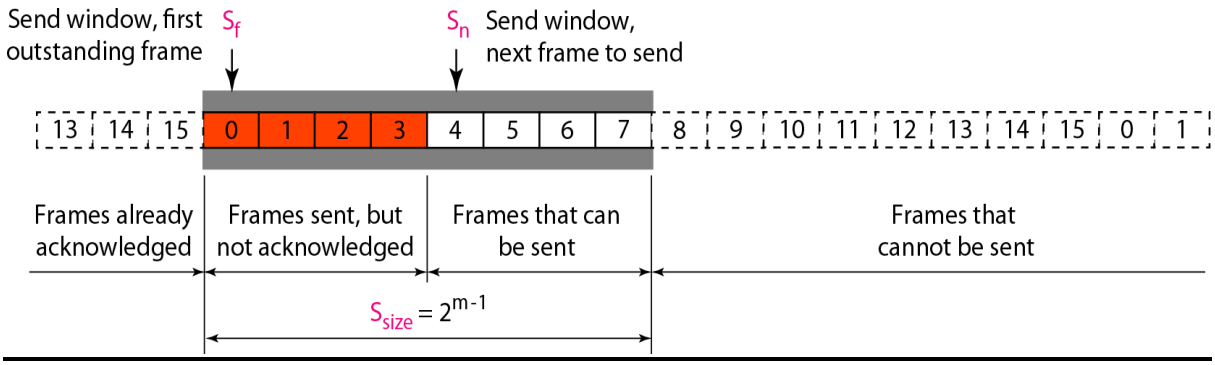
Course Name: A Level (2nd Sem) Subject: DCN

Topic: Selective Repeat ARQ Date: 08-04-20

- In Go-Back-N ARQ, The receiver keeps track of only one variable, and there is no need to buffer out-of- order frames; they are simply discarded. However, this protocol is very inefficient for a noisy link.
- In a noisy link a frame has a higher probability of damage, which means the resending of multiple frames. This resending uses up the bandwidth and slows down the transmission.
- For noisy links, there is another mechanism that does not resend N frames when just one frame is damaged; only the damaged frame is resent. This mechanism is called **Selective Repeat ARQ**.
- Selective Repeat ARQ protocol resends only the damaged frame
- It defines a Negative Acknowledgment (NAK) that report the sequence number of a damaged frame before the timer expires.
- It is more efficient for noisy links, but the processing at the receiver is more complex.

Sender Window:

- Similar as in go-back N sender window concept (before & after sliding.) The only difference in sender window between Go-back N and Selective Repeat is Window size.

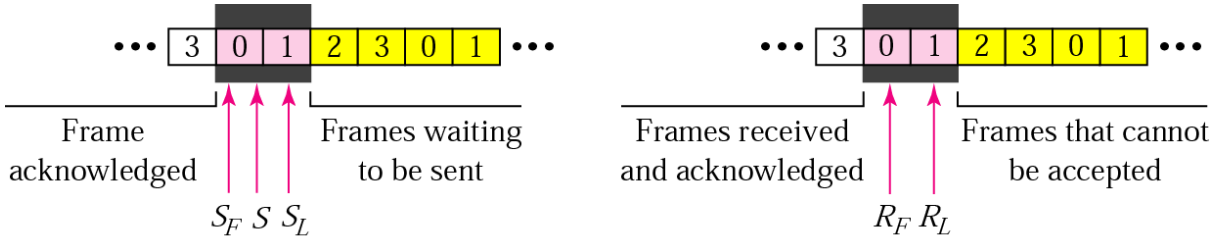


Receiver window:

- The receiver window in Selective Repeat is totally different from the one in Go Back-N. First, the size of the receive window is the same as the size of the send window (2^{m-1}).
- The Selective Repeat Protocol allows as many frames as the size of the receiver window to arrive out of order and be kept until there is a set of in order frames to be delivered to the network layer.

- Because the sizes of the send window and receive window are the same, all the frames in the send frame can arrive out of order and be stored until they can be delivered.
- However the receiver never delivers packets out of order to the network layer.
- Above Figure shows the receive window. Those slots inside the window that are coloured define frames that have arrived out of order and are waiting for their neighbours to arrive before delivery to the network layer.
- In Selective Repeat ARQ, the size of the sender and receiver window must be at most one-half of 2^m.

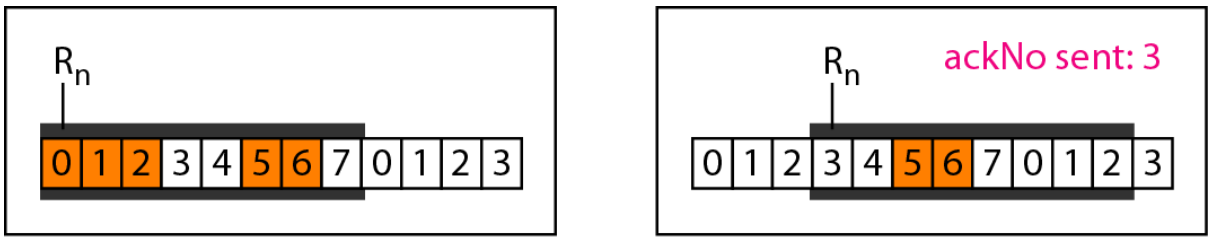
- *The window size is reduced to one half of* $\mathbf{2^m}$
- *Sender window size = receiver window size =* $\mathbf{2^m}$ */2*
- *Window size = sequence number/2*
- *If m = 2, Window size = 4/2=2*
- *Sequence number = 0, 1, 2 , 3*



a. Sender window

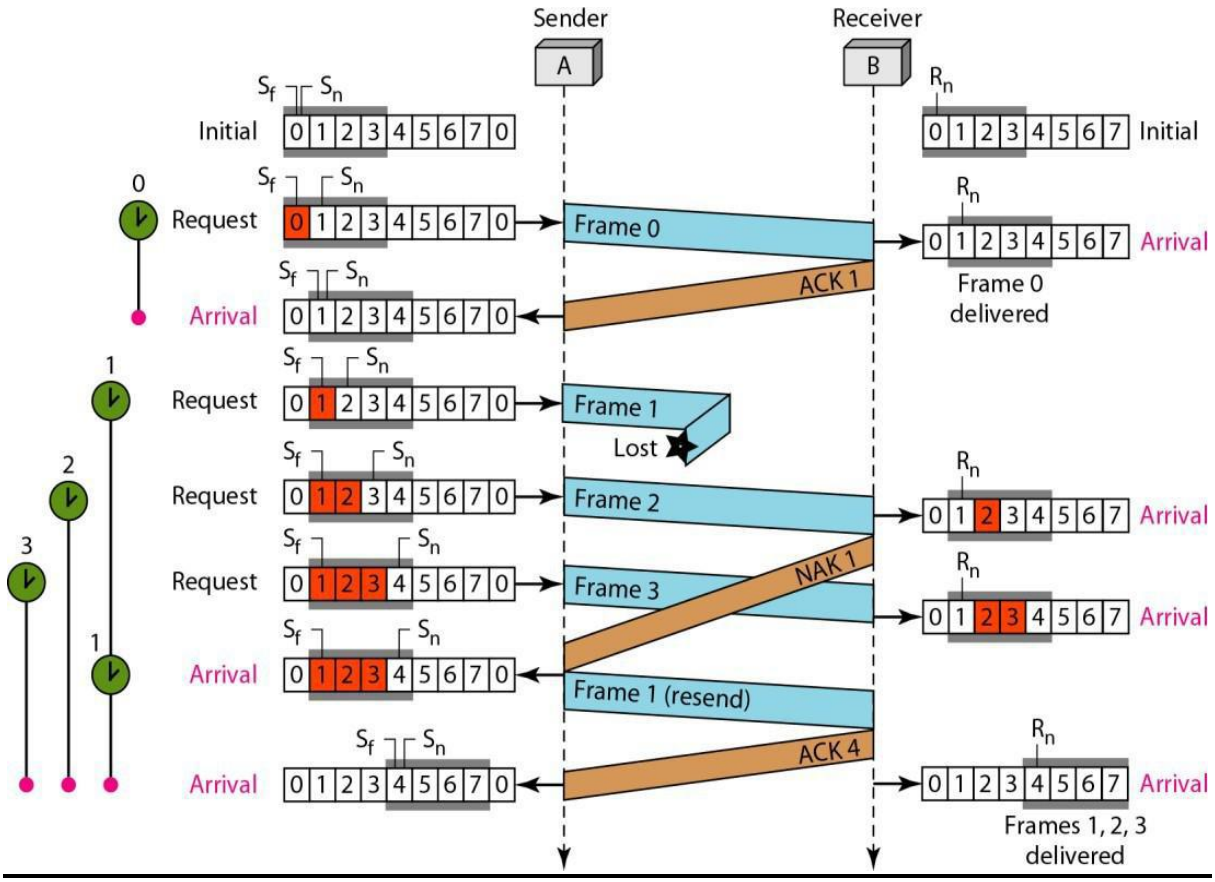
b. Receiver window

Delivery of Data in Selective Repeat ARQ:



a. Before delivery

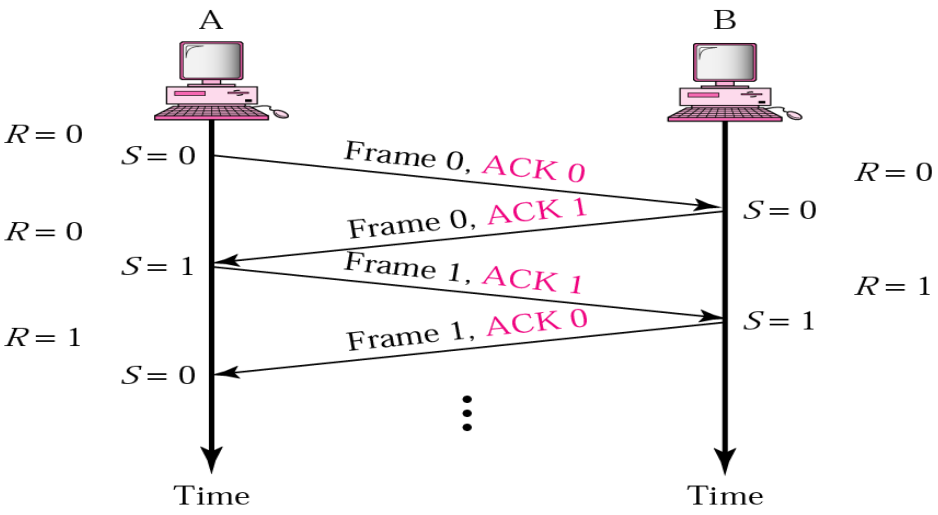
b. After delivery



Piggybacking:

A technique called **piggybacking** is used to improve the efficiency of the bidirectional protocols. When a frame is carrying data from A to B, it can also carry control information about arrived (or lost) frames from B; when a frame is carrying data from B to A, it can also carry control information about the arrived (or lost) frames from A.

Thus, piggybacking is a method to combine a data frame with an acknowledgment. It can save bandwidth because data frame and an ACK frame can combined into just one frame



Exercises:

A. **What do you understand by Selective-Repeat ARQ? Compare and contrast Go-Back-N ARQ and Selective Repeat ARQ.**

B. **Explain the following cases in Selective-Repeat ARQ:**

   a) **Lost Data Frame**
   b) **Lost ACK Frame**
   c) **Lost ACK Frame and Lost Data Frame**