2 ARQ

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THAPAR INSTITUTE
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Course: Computer and Communication Networks

Topic: Sliding Window protocol

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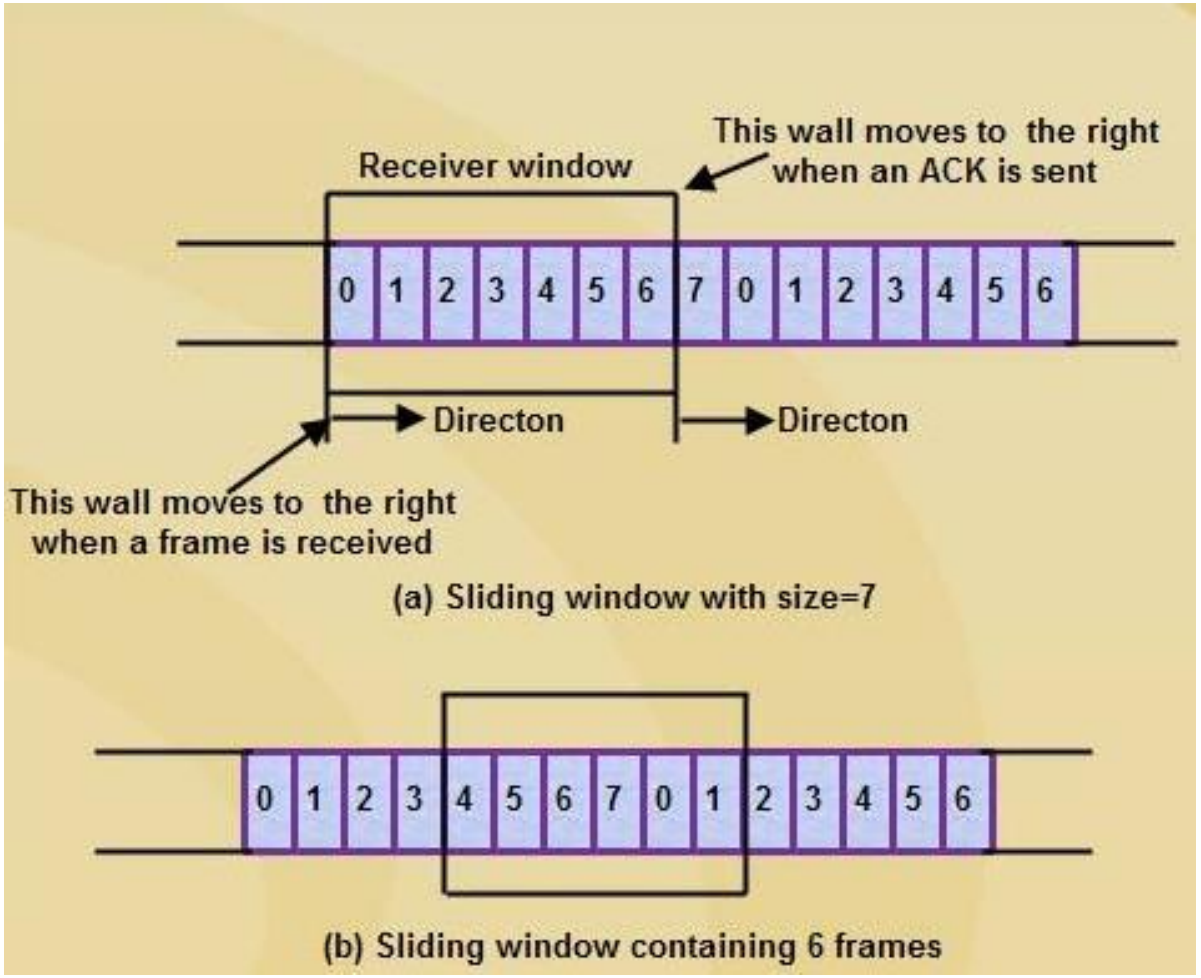
Sliding Window Protocol

- Sliding window refers to an imaginary boxes that hold the frames on both sender and receiver side.

- Sliding window protocols are data link layer protocols for reliable and sequential delivery of data frames.
- Multiple frames can be sent by a sender at a time before receiving an acknowledgment from the receiver.
- Sliding window method is also known as windowing.
- Frames are numbered modulo- n, which means they are numbered from 0 to n-l.

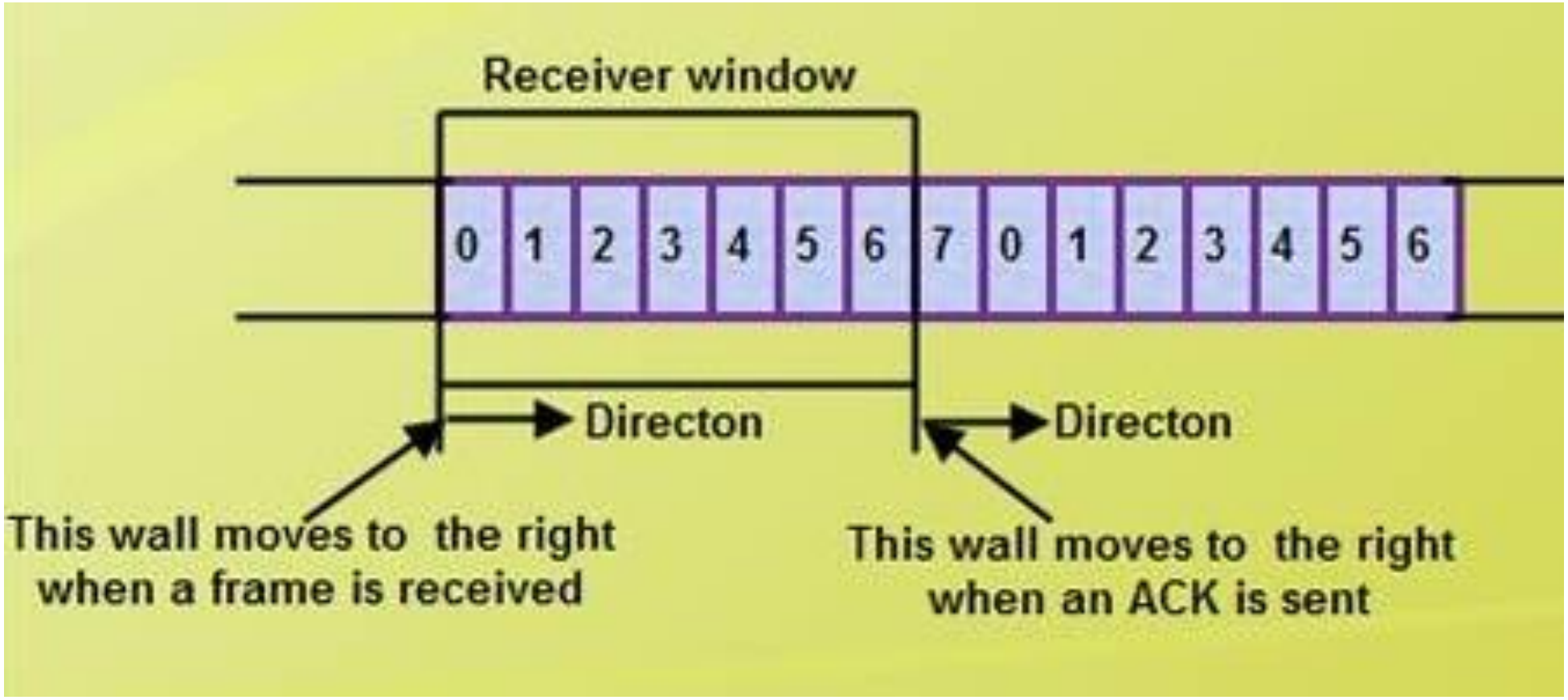
Reference: 1. Ferouzan, Behrouz A., Data Communications and Networking, 2. https://www.tutorialspoint.com 3. http://ecomputernotes.com/

Sliding Window on Sender Side

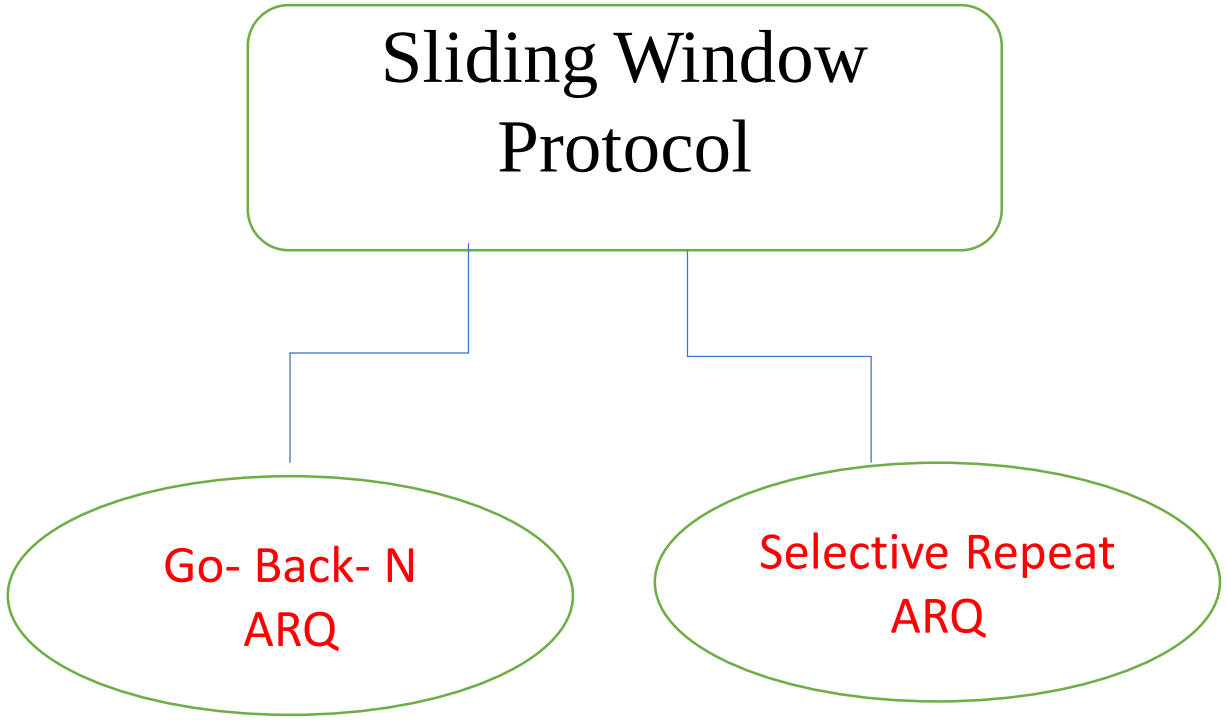


Reference: 1. Ferouzan, Behrouz A., Data Communications and Networking, 2. https://www.tutorialspoint.com 3. http://ecomputernotes.com/

Sliding Window on Receiver Side

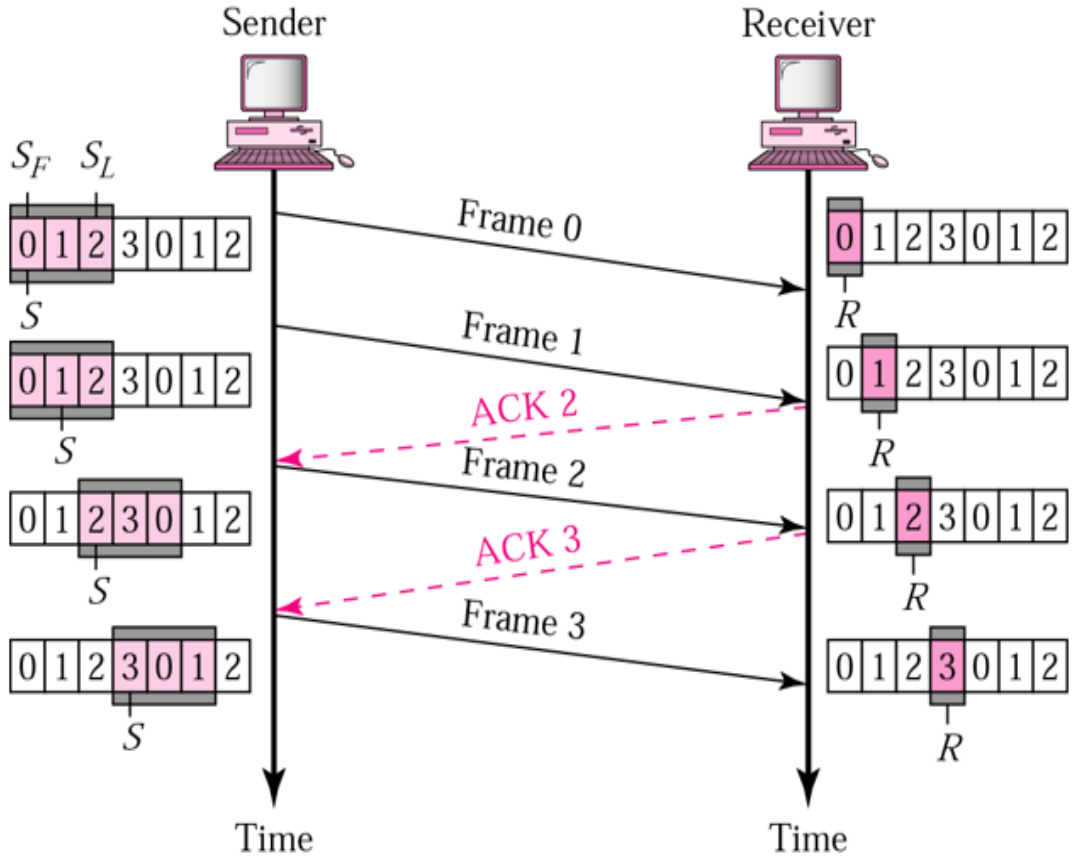


Two Types

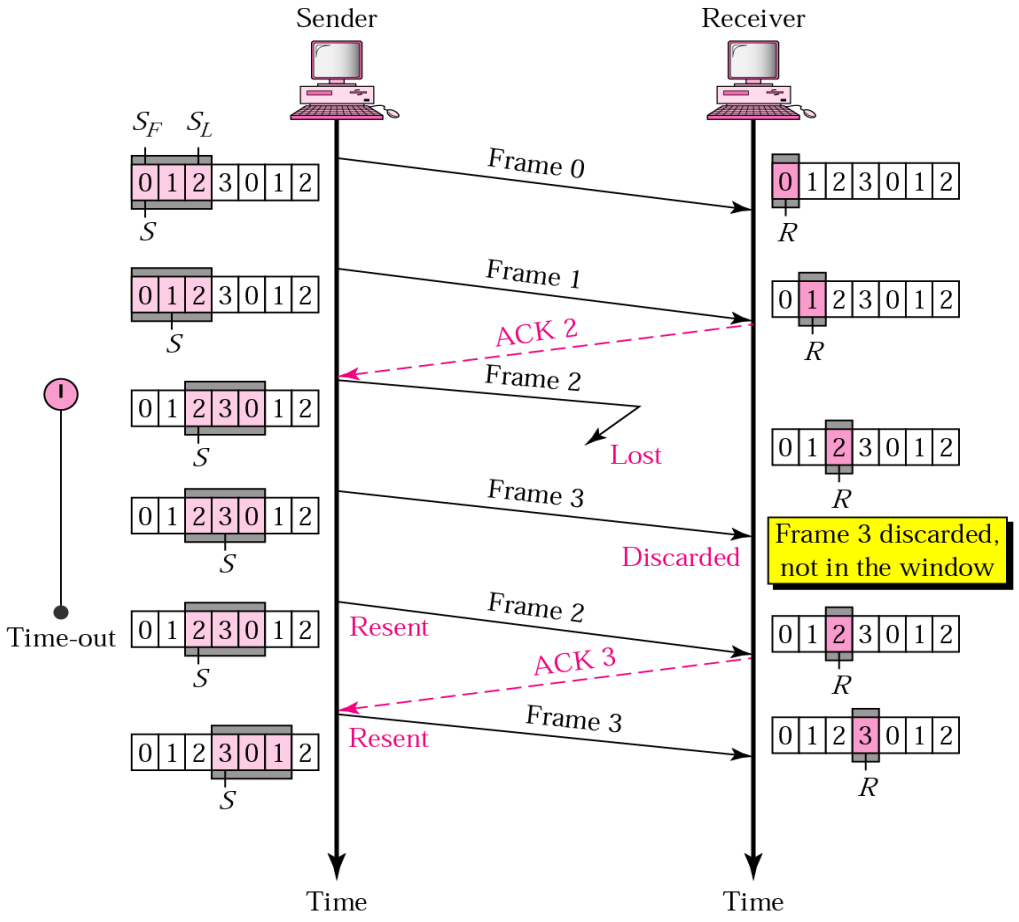


Go-Back-N ARQ

- Sender send no. of frames without worrying about acknowledgement.
- The sequence numbers range from 0 to 2^m - 1.
- There should be a copy of these frames until the acknowledgments arrive.
- One ACK can acknowledge more than one frame means uses cumulative acknowledgements.
- Go back N does not accept the corrupted frames, and out of order frames.
- Retransmission of frame.
- When the frame is damaged the sender goes back and sends a set of frames starting from the last one ACKn'd

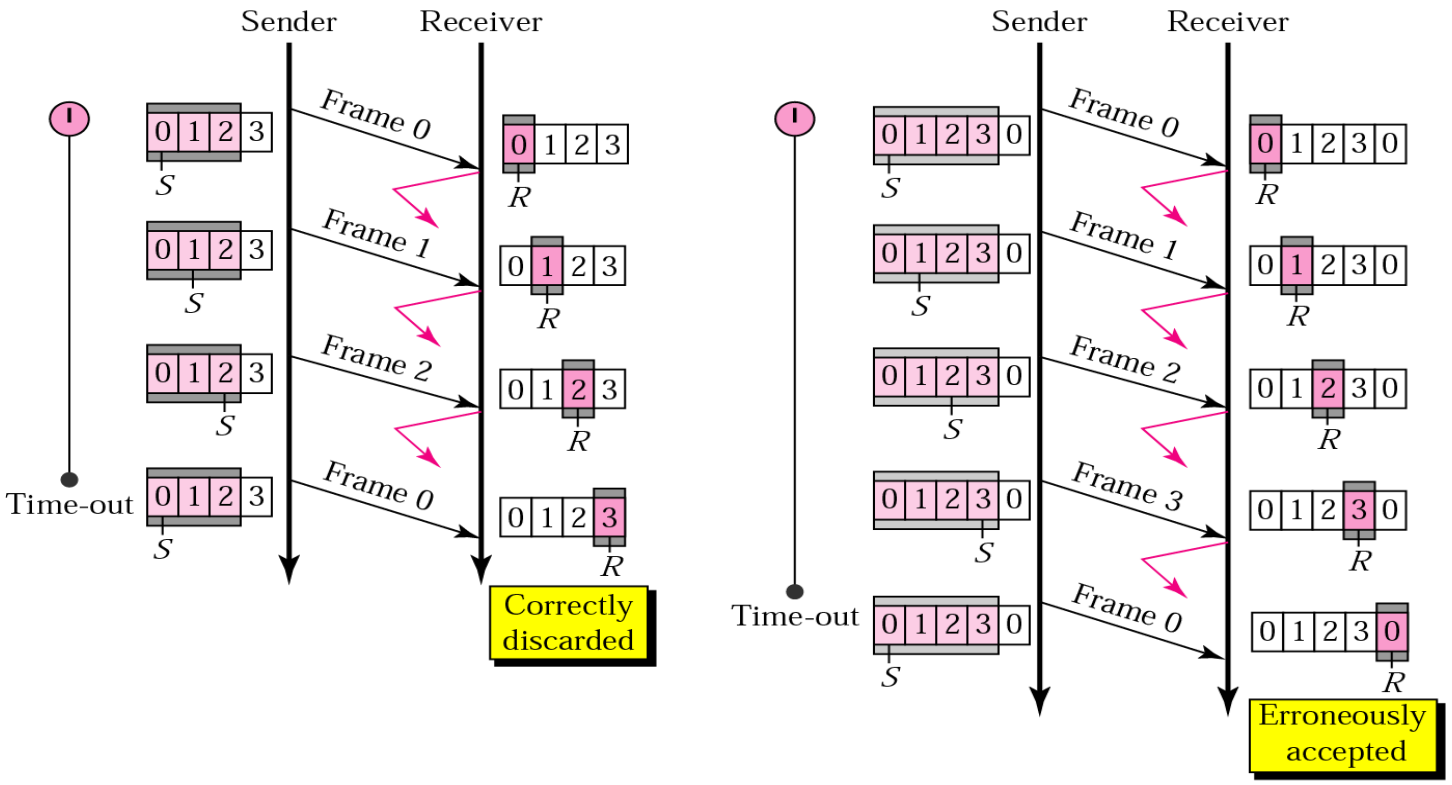


Damaged Frame or Lost Data Frame



Reference: 1. Ferouzan, Behrouz A., Data Communications and Networking, 2. Stallings William, Data and Computer Communication

Sender window size



a. Window size < 2^m

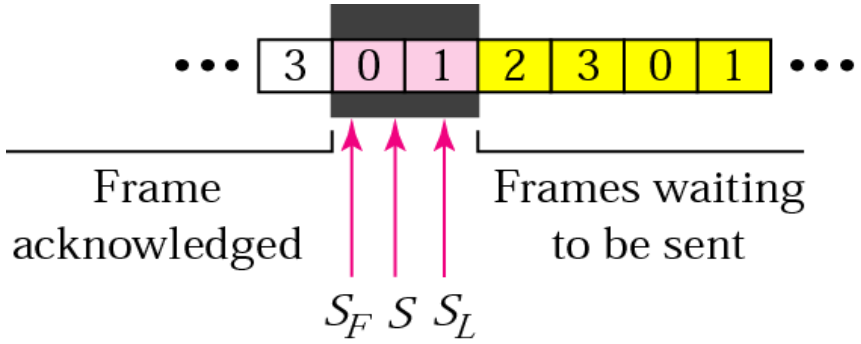
b. Window size = 2^m

- **m bits allotted within a header for seq. numbers**
  ⇒ 2^m possible sequence numbers
  - **how big should the sender window be!?**
  - **W > 2^m cannot be accepted – multiple frames with same seq. # in the window ⇒ ambiguous ACKs**
  - **W = 2^m can still cause some ambiguity – see below**
  - **W = 2^m – 1 acceptable !!!**

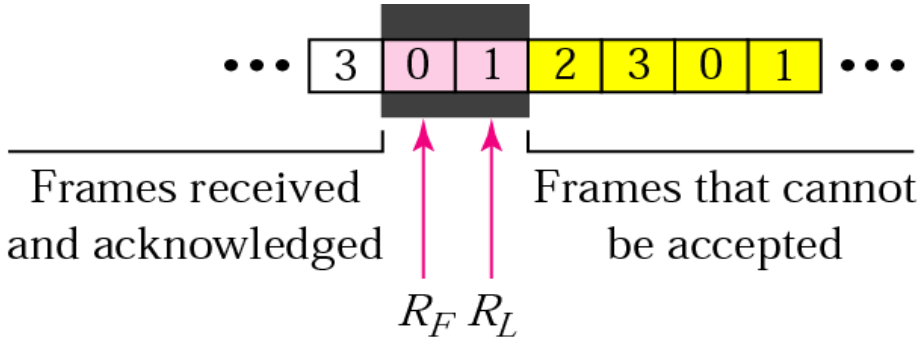
Selective-Repeat ARQ

- Selective-Repeat ARQ technique is more efficient than Go-Back-n ARQ.
- In Go-Back-N Protocol, if the sent frame are find suspected then all the frames are re-transmitted from the lost packet to the last packet transmitted.
- Retransmission of all data frames will occupy the network bandwidth unnecessarily, it increases the network delay.
- The selective repeat protocol retransmits only that frame which is damaged or lost. In selective repeat protocol, the retransmitted framed is received out of sequence.
- The receiver storage buffer keeps all the damaged frames on hold until the frame in error is correctly received.
- The receiver must have an appropriate logic for reinserting the frames in a correct order.
- The sender must consist of a searching mechanism that selects only the requested frame for retransmission.

Sender and Receiver windows



a. Sender window



b. Receiver window

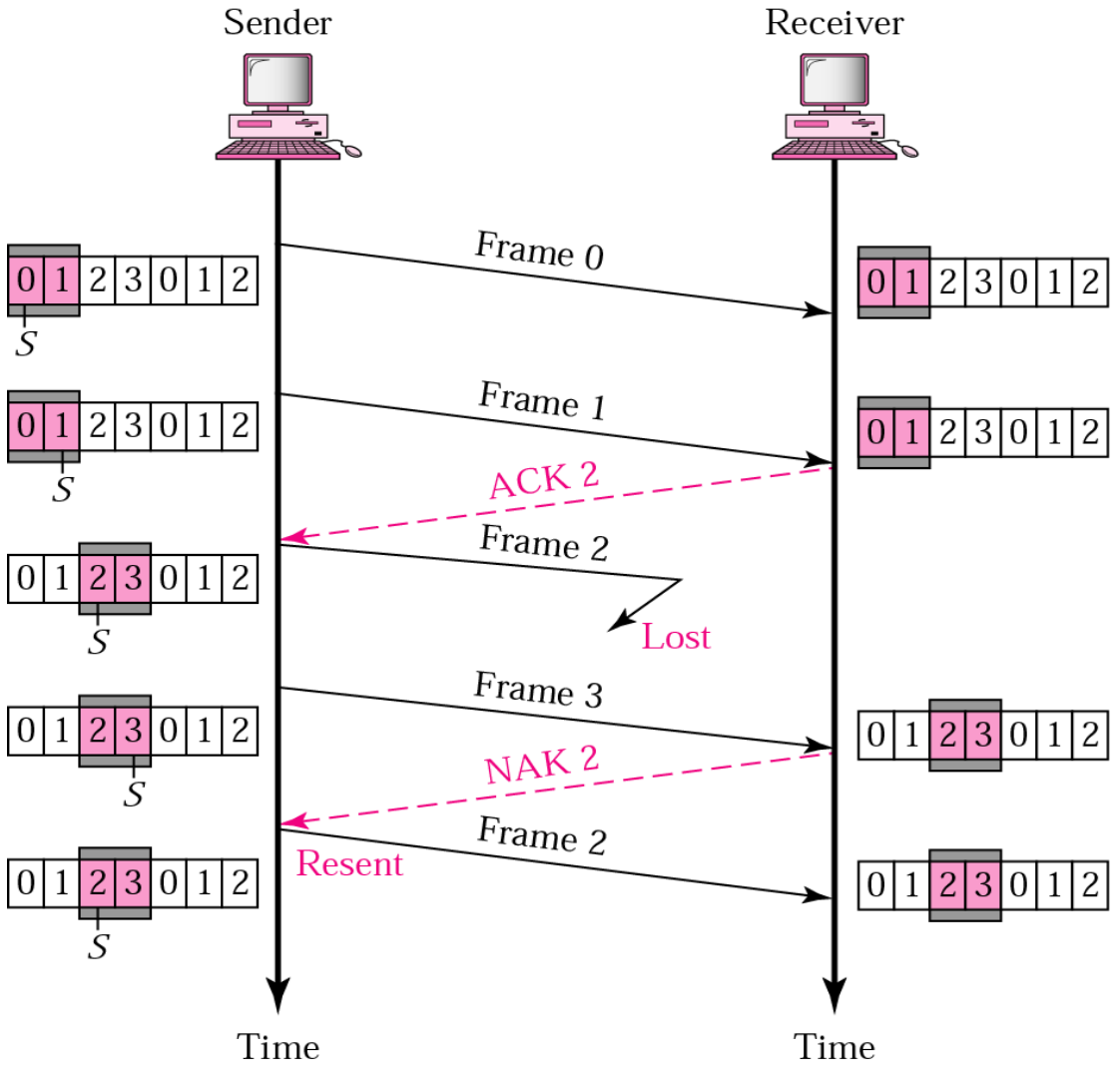
Reference: 1. Ferouzan, Behrouz A., Data Communications and Networking, 2. Stallings William, Data and Computer Communication

Note:

In Selective Repeat ARQ, the size of the sender and receiver window must be at most one-half of 2^m.

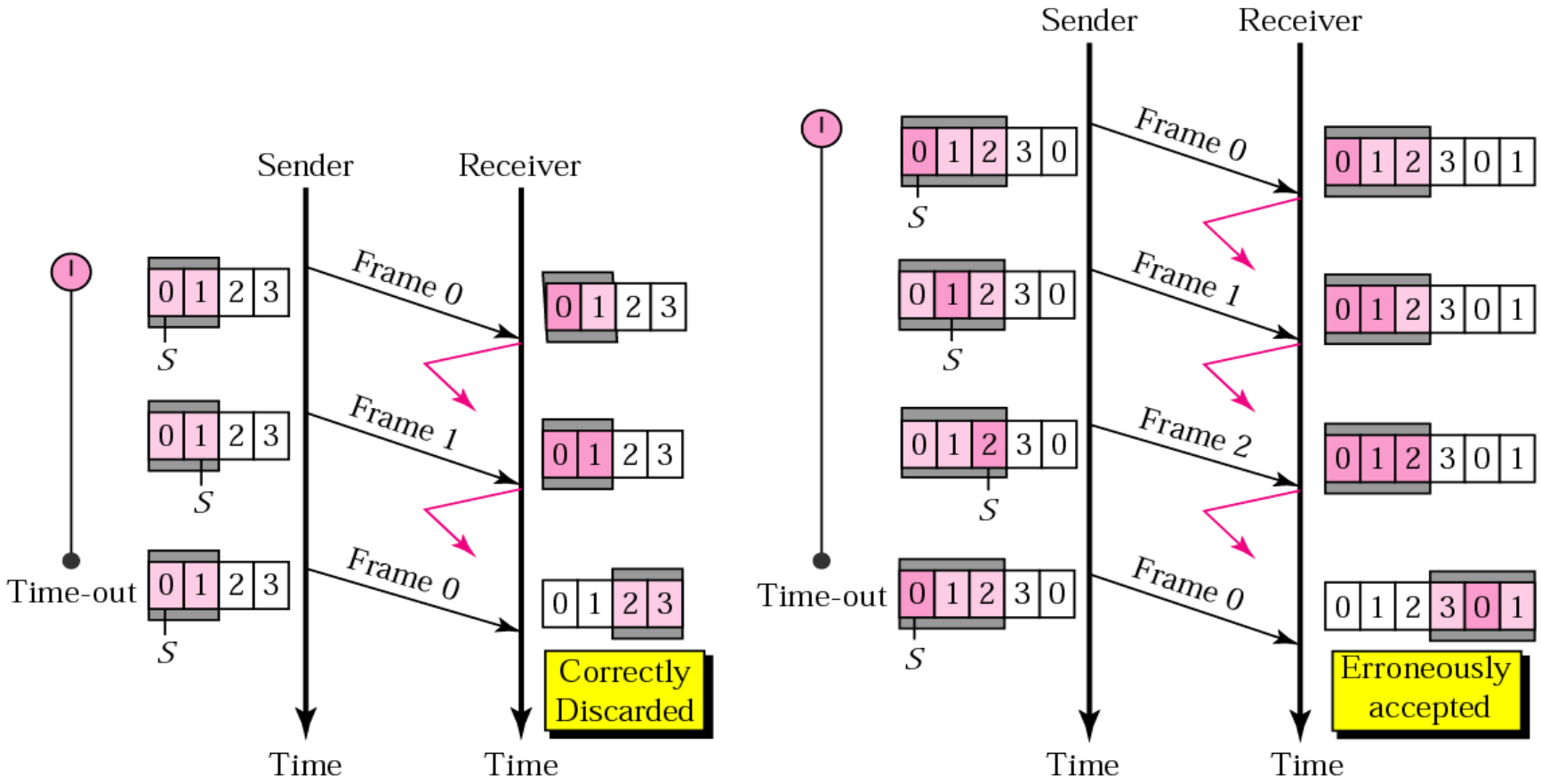
Reference: 1. Ferouzan, Behrouz A., Data Communications and Networking, 2. Stallings William, Data and Computer Communication

Selective Repeat ARQ, lost frame



Reference: 1. Ferouzan, Behrouz A., Data Communications and Networking, 2. Stallings William, Data and Computer Communication

Window Sizes



a. Window size = 2^{m-1}

b. Window size > 2^{m-1}

Comparison Chart

BASIS OF DIFFERENCE	GO-BACK-N PROTOCOL	SELECTIVE REPEAT PROTOCOL
Retransmission	Go-Back-N protocol retransmits only those frames which are damaged or corrupted.	Selective repeat protocol retransmits only that frame that is damaged or corrupted.
Need For Sorting	In the Go-back-N protocol, there is need for the sorting of frames that are on the receiver side to maintain the proper sequence of frames.	In the repeat protocol, there is absolutely no need for sorting the sender or the receiver side.
Storage Of Frames	In the Go-Back-N protocol, the receiver stores the frames that are received after encountering the damaged frame in a buffer, till the damaged frame is resent by the sender.	In selective repeat protocol, the receiver does not store any frame that is received after encountering the damaged frame, till the damaged frame is retransmitted.
Bandwidth Wastage	In Go-Back-N protocol, there is relatively less wastage of the bandwidth when compared to the selective repeat protocol in retransmission of frames.	In selective repeat protocol, there is a lot of wastage in regard to the bandwidth, in case there is a high error rate in the transmission.
Sliding Window Size	Go-Back-N protocol has a sliding window of size less than or equal to (N+1)/2.	Selective repeat protocol has a sliding window of N-1.
Type of Acknowledgement	In Go-Back-N protocol, the type of acknowledgement is cumulative.	In selective repeat protocol, the type of acknowledgement is individual.
Complexity	The Go-Back-N protocol is slightly more complicated because it comprises of logics, strategies and other functions which are not present in all protocol.	The selective repeat protocol is not complicated in any way.

Thank You