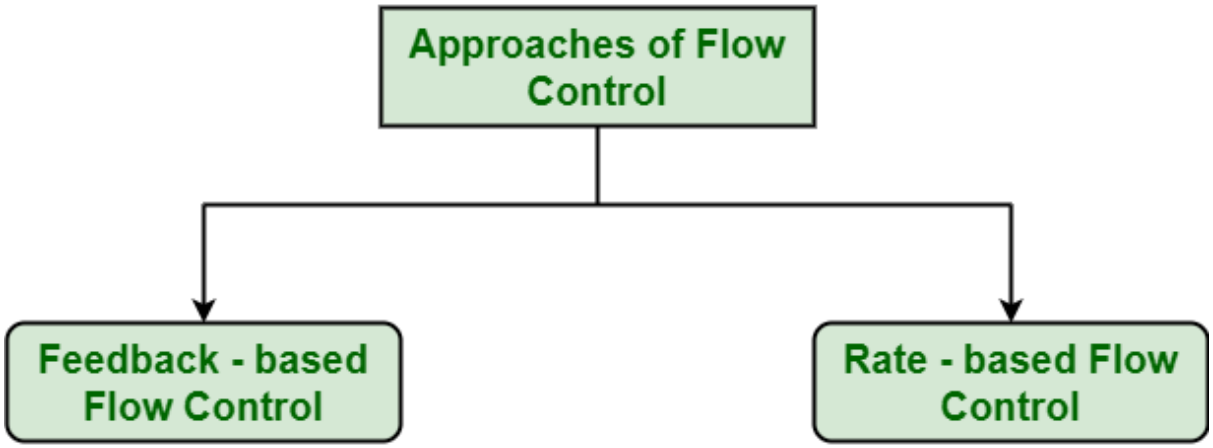
FLOW CONTROL

Flow control is a technique that allows two stations working at different speeds to communicate with each other.

It is a set of measures taken to regulate the amount of data that a sender sends so that a fast sender does not overwhelm a slow receiver.

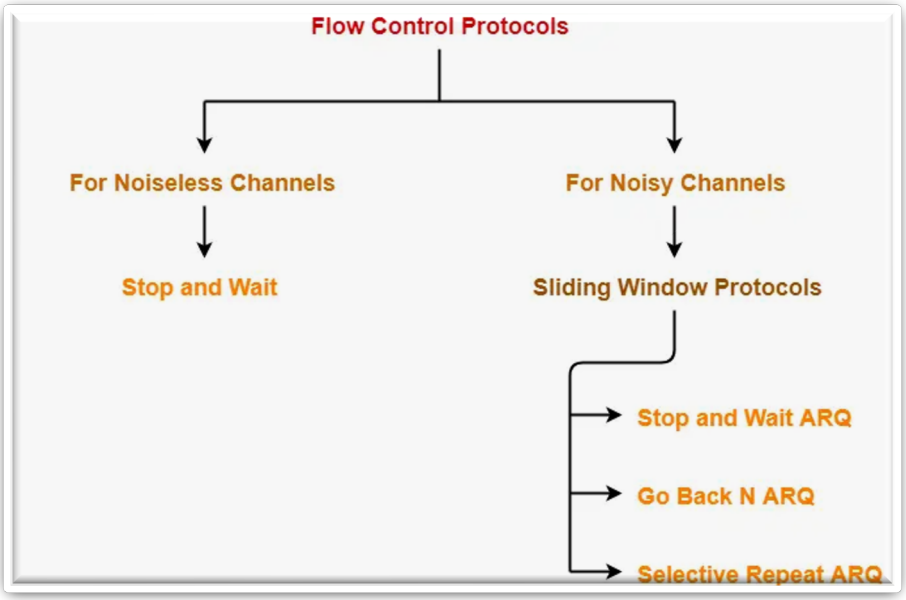
Approaches to Flow Control :



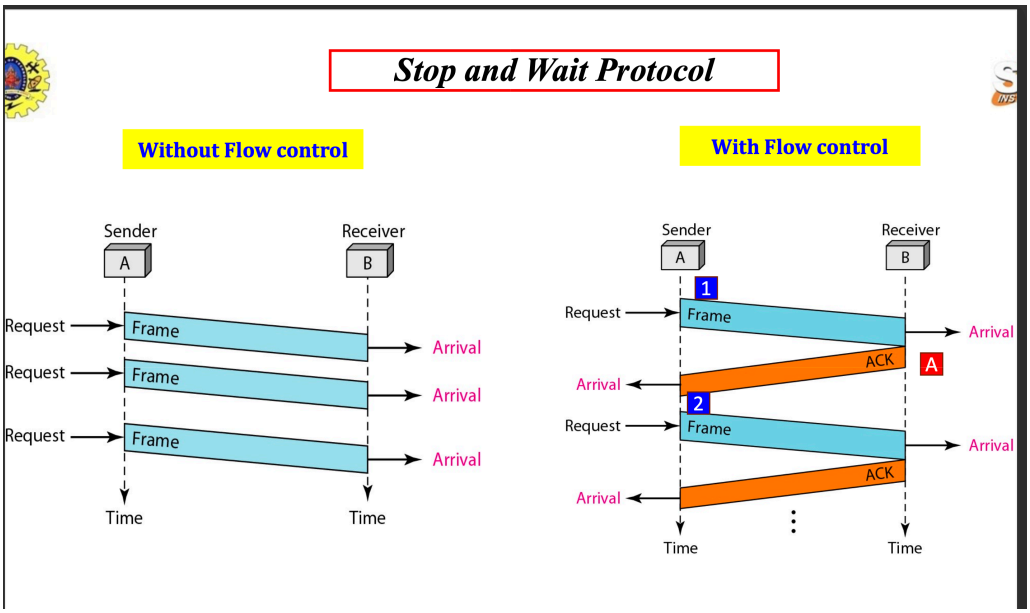
- **Feedback – based Flow Control :** In this control technique, sender simply transmits data or information or frame to receiver, then receiver transmits data back to sender and also allows sender to transmit more amount of data or tell sender about how receiver is processing or doing. This simply means that sender transmits data or frames after it has received acknowledgements from user.
- **Rate – based Flow Control :** In this control technique, usually when sender sends or transfer data at faster speed to receiver and receiver is not being able to receive data at the speed, then mechanism known as built-in mechanism in protocol will just limit or restricts overall rate at which data or information is being transferred or transmitted by sender without any feedback or acknowledgement from receiver.

Techniques of Flow Control in Data Link Layer :

There are basically two types of techniques being developed to control the flow of data



Stop and Wait Protocol



- The sender sends a frame and waits for acknowledgment.
- Once the receiver receives the frame, it sends an acknowledgment frame back to the sender.

- On receiving the acknowledgment frame, the sender understands that the receiver is ready to accept the next frame. So it sender the next frame in queue.

Sliding Window Protocol

The sliding window is a technique for sending multiple frames at a time. It controls the data packets between the two devices where reliable and gradual delivery of data frames is needed. The data frames shared in the channel are defined by the window size mentioned in the network model, which defines the maximum number of frames that can be transmitted at a time from the sender to the receiver side before expecting any acknowledgment. Each of the frames in the network model is assigned a sequence number to increase the transmission efficiency.

Stop-and-wait ARQ protocol
Uses timers and acknowledgments to regulate data flow. It's easy to implement but inefficient for long distances.

Go-Back-N ARQ protocol
Go – Back – *N* ARQ provides for sending multiple frames before receiving the acknowledgment for the first frame. It uses the concept of sliding window, and so is also called sliding window protocol. The frames are sequentially numbered and a finite number of frames are sent. If the acknowledgment of a frame is not received within the time period, all frames starting from that frame are retransmitted.

Selective Repeat ARQ
This protocol also provides for sending multiple frames before receiving the acknowledgment for the first frame. However, here only the erroneous or lost frames are retransmitted, while the good frames are received and buffered.

Working of the Sliding Window Protocol

The working of the sliding window protocol can be divided into two steps sender steps, and the receiver steps and also some important values are needed in a network model for smooth transmission of the data frames are:

- Sender and the receiver side
- Window Size
- The total data frames to be transmitted
- Proper sequencing of the frames

Steps for the Sender Side

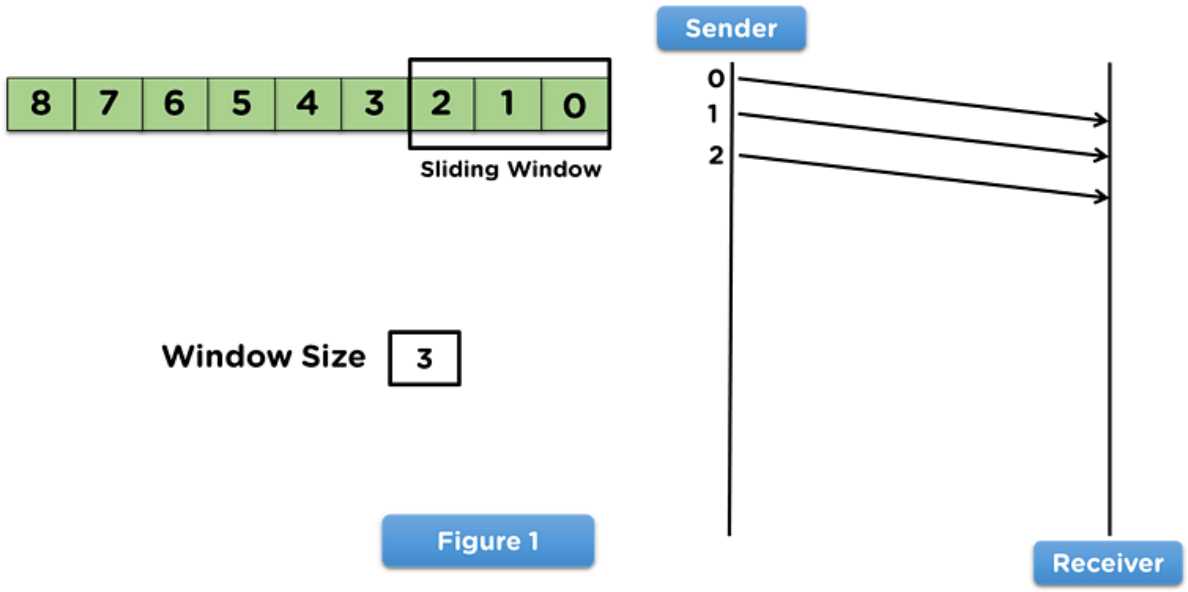
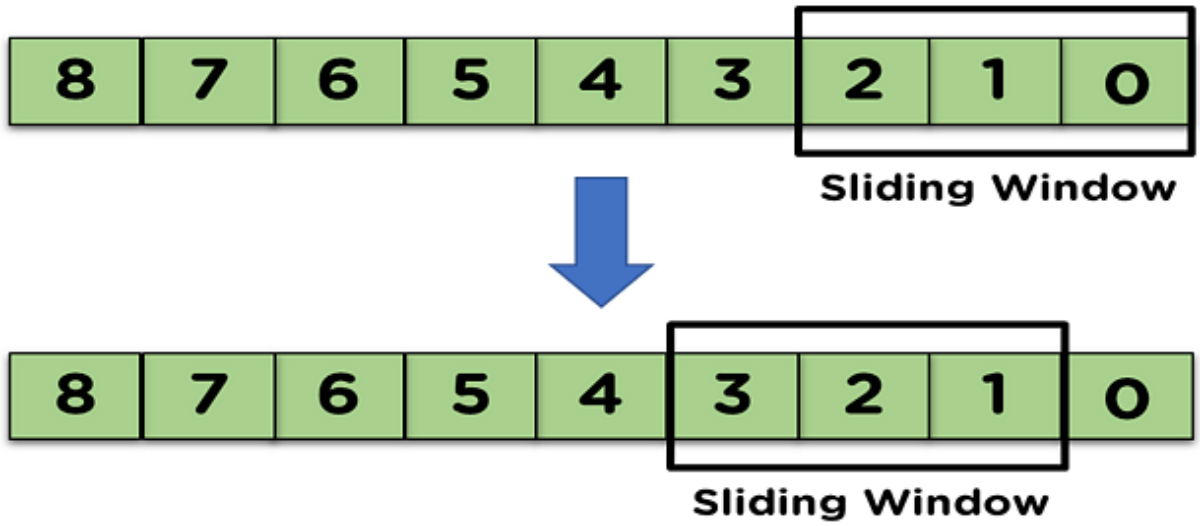


Figure 1

- To begin with, the sender side will share data frames with the receiver side per the window size assigned to the model.
- The sliding window will appear on the frames transmitted over to the receiver side.
- Then the sender will wait for an acknowledgment from the receiver side for the shared frames,



- When the receiver transmits the acknowledgment of the first transmitted frame, the sliding window will shift from the acknowledged frame.

Steps for the Receiver Side

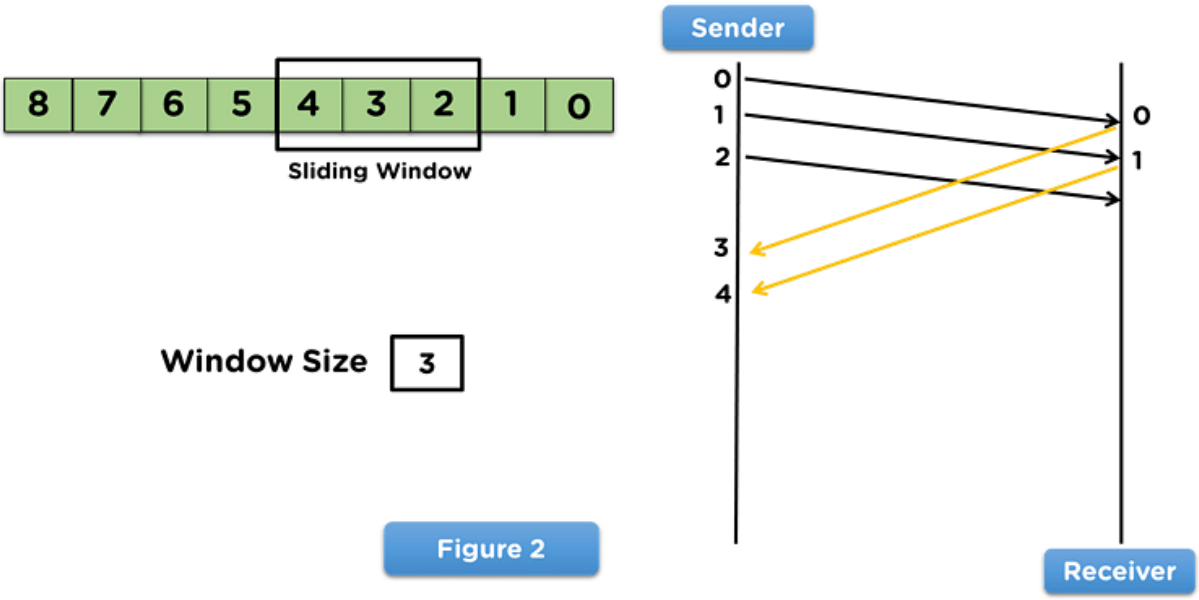


Figure 2

- On receiving the data frames from the sender side, the receiver will use the frames in the network model.
- After the receiver uses the frame, it will transmit the acknowledgement to the sender side for that data frame.