

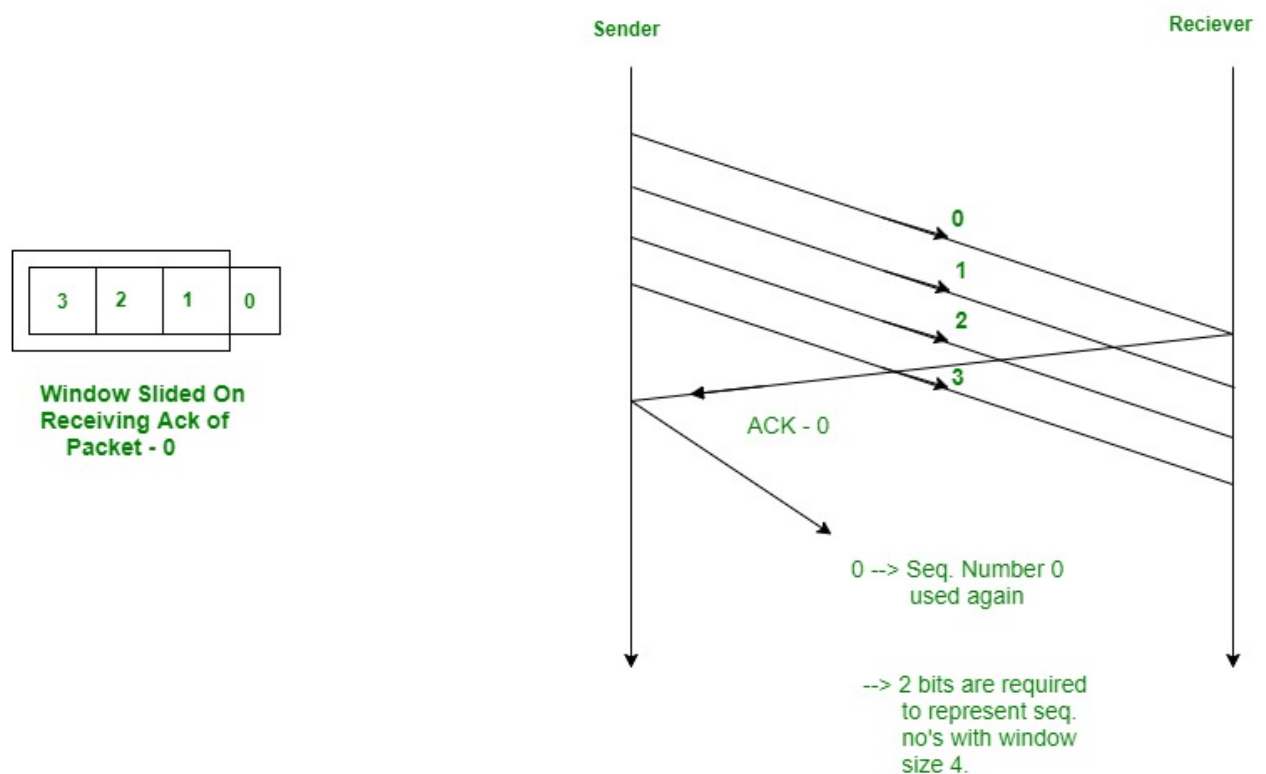
## EXPERIMENT 6

### OBJECTIVE:

#### 1. Implement sliding window protocol:

Reliable data transmission is critical in computer networking, particularly across long distances or in networks that have high latency. The Sliding Window Protocol is a critical component in obtaining this reliability. It is part of the OSI model's Data Link Layer and is used in several protocols, including TCP. Sliding Window protocol handles efficiency issues by sending more than one packet at a time with a larger sequence number. The idea is the same as pipelining in architecture. In this article, we will discuss about Sliding Window Protocol.

The Sliding Window Protocol is a key computer networking technique for controlling the flow of data between two devices. It guarantees that data is sent consistently and effectively, allowing many packets to be sent before requiring an acknowledgment for the first, maximizing the use of available bandwidth.



```
#include <stdio.h>
#include <stdlib.h>
```

```
#define MAX 10 // Maximum number of frames in the window
```

```
// Function to simulate sending frames and receiving acknowledgments
voidsliding_window_protocol(inttotal_frames, intwindow_size) {
int sent = 0; // Frames that have been sent
```

```
while (sent <total_frames) {
    // Send frames in the window
    printf("\nSending frames: ");
```

```

for (int i = 0; i < window_size && (sent + i) < total_frames; i++) {
    printf("%d ", sent + i);
}
printf("\n");

    // Simulate receiving acknowledgment for all frames in the window
    printf("Acknowledgments received for frames: ");
    for (int i = 0; i < window_size && (sent + i) < total_frames; i++) {
        printf("%d ", sent + i);
    }
    printf("\n");

    // Move the window
    sent += window_size;
}

printf("\nAll frames have been sent and acknowledged.\n");
}

int main() {
    int total_frames, window_size;

    // Input total frames to send and window size
    printf("Enter the total number of frames: ");
    scanf("%d", &total_frames);

    printf("Enter the window size: ");
    scanf("%d", &window_size);

    // Call the sliding window protocol function
    sliding_window_protocol(total_frames, window_size);

    return 0;
}

```

## OUTPUT

```

Enter the total number of frames: 10
Enter the window size: 3

Sending frames: 0 1 2
Acknowledgments received for frames: 0 1 2

Sending frames: 3 4 5
Acknowledgments received for frames: 3 4 5

Sending frames: 6 7 8
Acknowledgments received for frames: 6 7 8

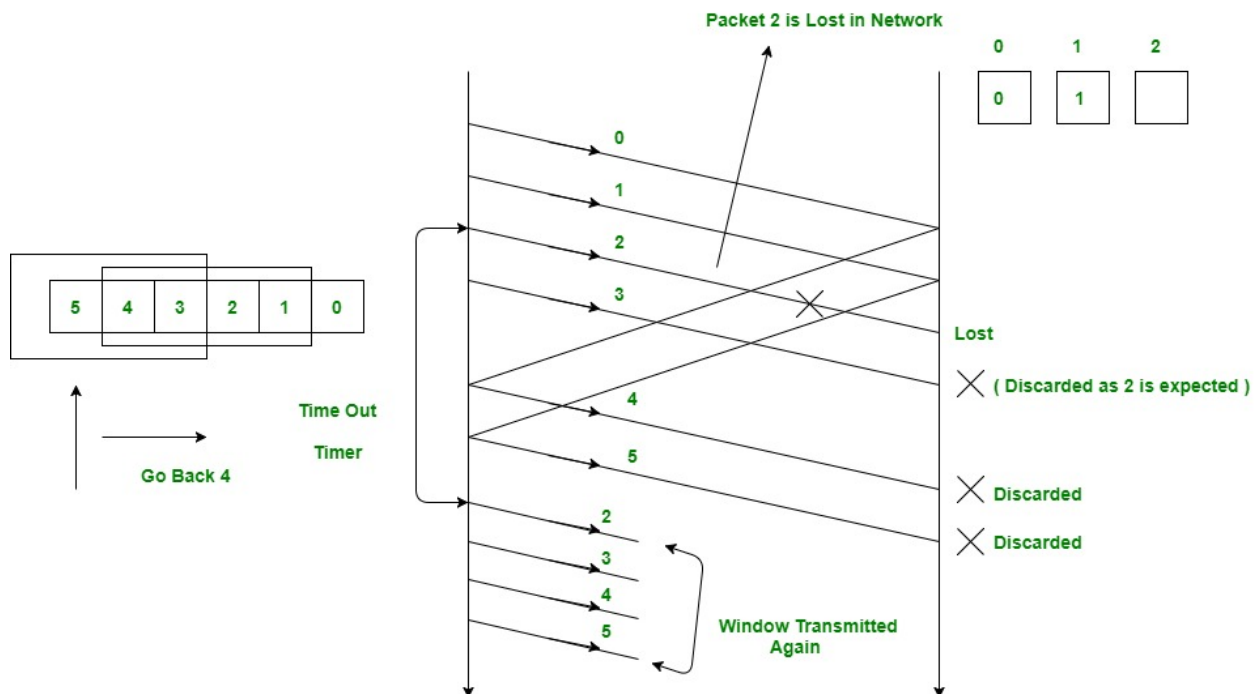
Sending frames: 9
Acknowledgments received for frames: 9

All frames have been sent and acknowledged.

```

## 2. C Program for Go-Back-N Protocol:

Go-Back-N ARQ allows sending more than one frame before getting the first frame's acknowledgment. It is also known as sliding window protocol since it makes use of the sliding window notion. There is a limit to the amount of frames that can be sent, and they are numbered consecutively. All frames beginning with that frame are retransmitted if the acknowledgment is not received in a timely manner.



```
#include <stdio.h>
#include <stdlib.h>

#define MAX_FRAMES 500 // Maximum number of frames

// Function to simulate the Go-Back-N protocol
void goBackN(int total_frames, int window_size) {
    int i, ack = 0; // Start with acknowledgment of the first frame

    // Loop to send all the frames
    while (ack < total_frames) {
        printf("\nSending frames:\n");

        // Send frames in the window
        for (i = 0; i < window_size && (ack + i) < total_frames; i++) {
            printf("Frame %d sent.\n", ack + i);
        }

        // Simulate error for a random frame
        int error = rand() % window_size;

        // Acknowledgment handling
        printf("Acknowledgment received for frames up to %d.\n", ack + error);

        // Move acknowledgment pointer forward to the last acknowledged frame
        ack += error + 1;

        // Resend the unacknowledged frames
        if (error < window_size - 1) {
            printf("Error in frame %d. Resending from frame %d.\n", ack + error, ack);
        }
    }

    printf("\nAll frames have been sent and acknowledged successfully.\n");
}
```

```

}

int main() {
    int total_frames, window_size;

    // Input total number of frames and window size
    printf("Enter total number of frames to send: ");
    scanf("%d", &total_frames);

    printf("Enter the window size: ");
    scanf("%d", &window_size);

    // Call the Go-Back-N protocol function
    goBackN(total_frames, window_size);

    return 0;
}

```

Output:

```

Enter total number of frames to send: 5
Enter the window size: 2

Sending frames:
Frame 0 sent.
Frame 1 sent.
Acknowledgment received for frames up to 1.

Sending frames:
Frame 2 sent.
Frame 3 sent.
Acknowledgment received for frames up to 2.
Error in frame 3. Resending from frame 3.

Sending frames:
Frame 3 sent.
Frame 4 sent.
Acknowledgment received for frames up to 4.

All frames have been sent and acknowledged successfully.

```