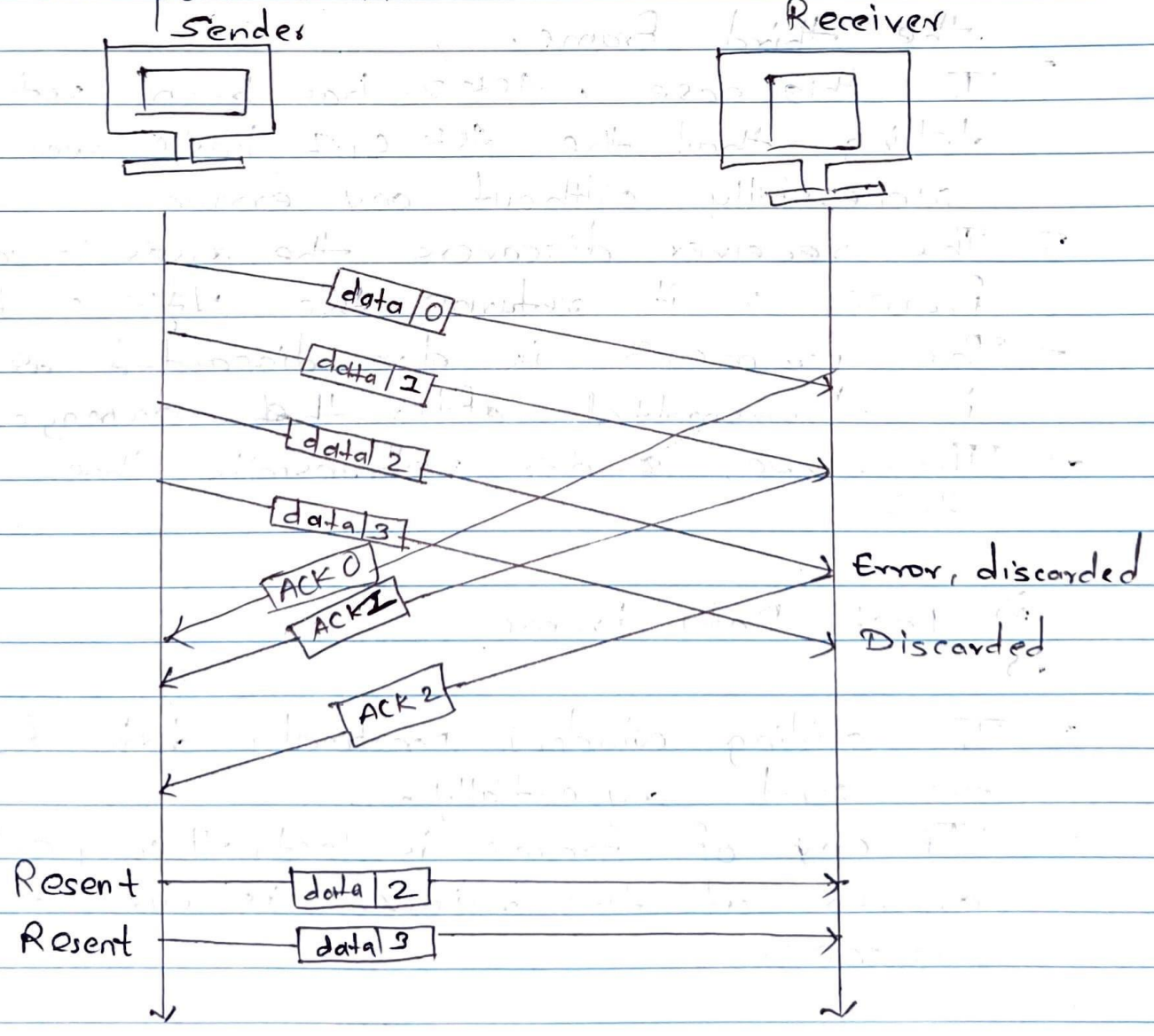
Om Shete
THADOMAL SHAHANI TSEC ENGINEERING COLLEGE
TE C32
2103163

Experiment No. 4

Aim: Simulation of Go Back N Flow control Algorithm.

Theory:

- In Go-Back-N ARQ protocol, if one frame is lost or damaged, then it retransmits all the frames after which it does not receive the positive ACK.



- There are three possilibities can occur for retransmission -

1) Damaged Frames

⇒

- When the frame is damaged, the receiver sends a NAK Frame.
- In above figure, three frames have been transmitted before an error discovered in the third frame.
- In this case, ACK 2 has been returned telling that the ACK 0, 1 have been received successfully without any error.
- The receiver discovers the error in data 2 frame, so it returns the NAK 2 frame.
- The frame 3 is also discarded as it is transmitted after that damaged frame.
- Therefore, sender retransmits the frame 2, 3.

2) Lost Data Frame

⇒

- In sliding window protocol, data frames are sent sequentially.
- If any of frame is lost, then next frame arrives at the receiver is out of sequence.
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- The receiver checks the sequence number of each of the frame, discovers the frame that has been skipped and returns the NAK for the missing frames.
- The sending device retransmits the frame indicated by NAK as well as the frames transmitted after the lost frame.

3) Lost Acknowledgement

⇒

- The sender can send as many frames as the windows allows before waiting for any acknowledgement.
- Once the limit of the window is reached and the sender has no more frames to send; he must wait for the acknowledgement.
- Problem: If the acknowledgemant is lost, then the sender could wait forever.
- Solution: To avoid such situation, the sender is equipped with the timer that start counting whenever the window capacity is reached.
- If the acknowledgenent has not been receeived within the time limit, then the sender retransmits the frame since the last ACK.

02/08/23.

Code:

```
#include <iostream>
using namespace std;

int main() {
  int count;
  cout << "Enter window size : ";
  int windowSize;
  cin >> windowSize;
  cout << "Enter total frames to be sent : ";
  int totalFrames;
  cin >> totalFrames;

  int senderFrames[totalFrames];
  for (int i = 0; i < totalFrames; i++) {
    senderFrames[i] = i;
  }

  for (int i = 0; i < totalFrames; i++) {
    cout << senderFrames[i] << " | ";
  }

  cout << endl;
  cout << "Do you want to start sending frames (0/1) : ";
  int choice;
  cin >> choice;
  cout << endl;

  if (choice == 1) {
    int ptrOnWindowLeftSender = 0;
    int ptrOnWindowLeftReceiver = 0;
    int totalSentFrames = 0;

    while (ptrOnWindowLeftSender < totalFrames) {
      count = 0;
      cout << "At Sender End:" << endl;
      for (int i = ptrOnWindowLeftSender;
           (i < totalFrames && count < windowSize); i++) {
        cout << "Sent frame[" << (i + 1) << "]" << endl;
        ptrOnWindowLeftSender++;
        totalSentFrames++;
        count++;
      }
      cout << endl;

      // Receiver side
      cout << "At Receiver end: " << endl;
      int j = 0;
      count = 0;
      for (int i = ptrOnWindowLeftReceiver;
           (i < totalFrames && count < windowSize); i++) {
```

```
        char yN;
        cout << "Did you receive frame[" << (i + 1) << "] (y/n) : ";
        cin >> yN;
        if (yN == 'n') {
          cout << "Frames will be sent again from frame no. " << (i + 1)
               << endl;
          cout << endl;
          ptrOnWindowLeftSender = i;
          break;
        } else {
          j++;
          ptrOnWindowLeftReceiver++;
        }
        count++;
      }

      if (j == windowSize) {
        cout << "All Frames from this window sent without errors. Sending next "
                "frames..."
             << endl;
        cout << endl;
      }
    }

    cout << endl;
    cout << "All frames are sent." << endl;
    cout << "Total no. of frames sent including retransmission is "
         << totalSentFrames << endl;
  }

  return 0;
}
```

Output:

```
Enter window size : 4
Enter total frames to be sent : 10
0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
Do you want to start sending frames (0/1) : 1

At Sender End:
Sent frame[1]
Sent frame[2]
Sent frame[3]
Sent frame[4]

At Receiver end:
Did you receive frame[1] (y/n) : y
Did you receive frame[2] (y/n) : n
Frames will be sent again from frame no. 2

At Sender End:
Sent frame[2]
Sent frame[3]
Sent frame[4]
Sent frame[5]

At Receiver end:
Did you receive frame[2] (y/n) : y
Did you receive frame[3] (y/n) : y
Did you receive frame[4] (y/n) : y
Did you receive frame[5] (y/n) : y
All Frames from this window sent without errors. Sending next frames...

At Sender End:
Sent frame[6]
Sent frame[7]
Sent frame[8]
Sent frame[9]
```

```
At Receiver end:
Did you receive frame[6] (y/n) : y
Did you receive frame[7] (y/n) : y
Did you receive frame[8] (y/n) : y
Did you receive frame[9] (y/n) : y
All Frames from this window sent without errors. Sending next frames...

At Sender End:
Sent frame[10]

At Receiver end:
Did you receive frame[10] (y/n) : y

All frames are sent.
Total no. of frames sent including retransmission is 13
```