AIM: write a program to implement flow control at data line layer using studing window protocal simulate the flow of frames from one node to another

- I Create a sender program with following features,
 - 1) Input window size from the user.
 - 2) Input a feet message from the user.
 - 3) consider 1 character Per frame
 - 4) create a frame with following fields.
 - 5) Bend the frames.
 - 6) wast for the acknowledgement from the Reciver
 - 7) Readers a file called Receiver buffer
 - 8) check Ack field for the acknowledgement number
 - a) If the Ack, number is as expected, send new set
- of frames accordingly,
- -> create a receiver file with following feetures.
 - 10) Reader a file called sender-buffer
 - 02) check the frame in
 - 3) Of frame: no are as expected, write the approprice Acre no In the receiver buffer file.

NOTE: Produce error and verity the behaviour of the program, raunually change the frame no and acle no in the files.

Student Observation, CODE! wall dramplym of margon to thin MIA import time, random and bould and addums def sender (window_size, message) base & new seq 200 18019 rebons a dans expected - frame - num = 0 det receiver (sender-buffer): non local expected-frame_num print ("f" in ... Receiver's turn (Expecting frame: d'expected-frame-num 3...") for frame in sender-buffer:
if frame ["seq"] = = expected frame pront (+" - ok Frame, [frame, [Seq'] else;

Print (+" -) ERROR Discarding out of order frame [frame [seg]]) sit willed brealest all me on sun singon print Ct " Reciver: Sending Ack for next expected broom en oil extrame. Ceapeeted frame num 3') return [? "type": "Ack", "ack-num". experted frame num 3]

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det simulate networke error Coender buffer, neceiverbuffer)
    Choice = random. randint (1, 10) (1990) & smith
    of choice == 1 and sender buffer! rousses = 000
i = random. randint (o, len (sender_buffer)_1)
         orig = Sender- buffer [i] ['seq']
        Bender-buffer [i] ['Seq'] + = 5,
        print (+ "In > Network error: Frame lorig }
                 correspond to Esender buffer [i] ['seq']?
         elef choice = = 2: rebreb 12) hing
             receiver buffer . clean cs
          print ("in ) network error: Acle from releiver
            how been lost (n")
 print ("- starting dimulation - ")
while bore & len Conessage ).
         print ( + " in l' = ' + 15 3 dender's terro { = '+ 15 3 )
        print (f " Current wirdow, base : 2 base 3, next seg Nune
        Enext-seq 3')
sender _ buffer = [f'seq' i, "dala": mersaage[i]3
      for i in range Creek-seq, min Chase +window_size
                      len (message))]]
       for I in sonder buffer
                print Ct "Sender Frame: & f ['Seq '] 3 | Patq:
                  Et ('Daba'] 3)
          next seq = boxx + len Csender-buffer)
          Simulati-network-error (sender_ buffer,
           receiver buffer)
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time sleeper)

receiver buffer = receiver Coender buffer) time. sleeper) (or 1) tribust mabrier = 20 ions ack = receiver buffer, popco) bis 1 == 201000 } bare: "Acle" and acle t'acle_numy, print Ct Bender: Received Acte for frame? alle [acle_neim] - 13. stidingwindow base = acle ["acle_num"] print Cf "sender: Received old or duplicate Acre C fack ['ack_n'um']3). No action.") printlt" In l'= '+153 Transmission Completel'=' prit ("- starting dimulation-") = "-- maipre-etis) not 2 and elle ws = unt Cinput ("Enter the window size (eg +) El Jest Lecept value Error: (Eps Jacobs)

ws -4 print (f'invalidinput Voing default windows 20 of lus-3 ") seem not meg = input (" Enter the message to sendleg. stiding window): (Bender Cws, meg) menter - delimenter - ex ros (semider - delimité

- (comes fun (Expeding trames s). OUTPUT: Enter the window size (29.4):5 Enter the message to send Ceg. sliding windows! birthday --- Starting Simulation-- 1 balgroom & smooth 3106 -> Sender's Turn Llos of all probable 1010000 current window: Base = 0, Newborg Now = 0 Sending Frame: 0 | Data = 1 b' sending Frame: 1 1 Data 121/1000 Bending Frame: 2 | Data = '91' Bending Frame: 3 Data = 't' Gending Frame: 4 | Data='n' -) networks error : Ack from releiver has been lost! --- Receiver's Turn (Expecting frame 0) ---> Ok . Frame - O accepted, pata: 'b' -> Ok. Frame 1 accepted, pata: 'i' -) Ok, Frame 2 allepted. Data: 'r' -> Ole, Frame 3 accepted. Data: 't' -) Ole. Frame H accepted : Data: 'h' peciver: Sending ACK for next experted frame: 5 Gender: Received Ack for frame 4. Stiding window -- Bender's Turn --Current wondow: Bare = 5. Next Seq Num + 5 Bending Frame : 5 / Paka: 'd' Gending Frame = 6 | Data: a

sending Frame: 7/ pala: 'y'

-- Reciper's Turn CExpecting Frame: 5) -- 109100 4 -> or. Frame 5 accepted: Data: d'in Tok Frame 6 accepted: Data: a Tole Frame 7 accepted: Data is y'ill controls Receiver, Bendeng Acie for next expected frame; 8 Sender, Received Ack for frame 7. Stidling window - Transmussion Complete +++11 1 smort prubing Berting Frame & 1 pala = 't' dending France 4 | Dodon in -) returned a row i Act from receiver tras been looked -- Receiver's Turn (Expeding frame 0) --> Ok. Frome O accepted. pata: 'b'. -> ole. Frame 1 occupted. pola:"; sole, from 2 alaphed. Pala ir 30k Frame 3 accepted all 14' DOLC. Frame H accepted pala "h peaver: Benderg ACIL for rext expected frame: 5 Rosult: Hance the program to implement flow control at dala link layer using sliding window protocol at data successfully by the