Computer Networks

A simulation of

the Alternating Bit &

The Go Back N

Transport Layer Protocols

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The Alternating Bit Protocol

Assumptions

I assumed in my implementation that when the receiving side gets a packet out of order that would mean that the last acknowledgment it sent was either corrupted or lost so it resends the last acknowledgement again.

The Code

The code of the AB protocol is attached to this report in the file 16P8100_AB.c

The Implementation

The Global Variables

float inc : represents the timer increment value and is initialized with 20.0
Boolean send : is true when the last send packet is acknowledged and is false when it isn't
initialized to true
Integer seq : represents the sequence number to be put in the packet by A and is initialized to 0
Integer ack : represents the acknowledgement number to be put in the packet by B and is
initialized to 0
pkt buffer : is a buffer in which any sent packet will be saved until it is acknowledged and the next one would be saved in its place, it is initialized to void

A_outout

The A_output starts off by checking the send boolean value , if send is true it creates a packet with seqnum = seq, acknum = 0, the paload = to the message and the checksum = seqnum + acknum + the integer ascii value of each character in the payload, saves the packet in the variable buffer, calls tolayer3 passing in the packet, and changes the seq to 0 if they were 1 and to 1 if they were 0.
Then it prints out the message "A: sending a packet with seq with data = , checksum = "
If the send is false, i.e the last sent packet was unacknowledged the function only prints the following : "A: Can't send this data, there's an unacknowledged packet"

A_input

The A_input starts off by stopping the timer and then checks for three things :
1. The seqnum of the packet that arrived is not equal to seq (which was changed in A_output)

2. The acknum = 0
3. The checksum = the seqnum

If the three conditions occurred then this is an acknowledgement and isn't corrupt so the function prints the following : "A: An ACK for packet with seq is received and checksum = "
If on the other hand the acknum = 1 and the checksum = seqnum+1 then this is a Non Acknowledgement and the function resends the packet in the buffer using A_output and starts the timer again, also it prints : "A: An NACK for packet with seq is received and checksum = "
Otherwise if the checksum doesn't equal the checksum then this is a corrupt packet and the function resends the packet in the buffer using A_output and starts the timer again, also it prints :"A: A Corrupt packet with seq is received and checksum = "

A_timerinterrupt

This function is called whenever the timer of the A side ends , it prints the following :
"A: Timer goes off " , then it sets send to true and calls A_output passing in the buffered message

B_input

The function firsts creates two variables the rcvchecksum (intialized to the checksum of the recieved packet) and the expchecksum which is then calculated the same way it was calculated in A_output,
The function checks for on of these three conditions:
1. rcvchecksum = expchecksum and the seqnum = ack (the expected bit)
2. rcvchecksum doesn't equal expchecksum and the seqnum = ack (the expected bit)
3. rcvchecksum doesn't equal expchecksum and the seqnum doesn't equal ack (the expected bit)

In the first condition the function will create an acknowledgement packet with seqnum = ack, acknum = 0, checksum = ack , then change the ack to 0 if it was 1 and to 1 if it was 0, then it will print "B: saving data : " "B: sending Acknowledgment with seq = , ack = checksum = "
Then it will send the packet to A side using the tolayer3 function after it saves the data using tolayer5
In the second condition the function will create a non-acknowledgement packet with senum = ack, acknum = 1 and checksum = ack+1 , then print the following to the user :
"B: received packet with seq = data: checksum = "
"B: packet is corrupt"
"B: sending Non acknowledgment with seq = , ack = checksum = "
then send the packet to the A side using the tolayer3
In the third condition the function will create a acknowledgement packet of the packet that was received before this, then print the following to the user :
"B: received packet with seq = data: checksum = "
"B: packet out of order"
"B: sending acknowledgment of last received packet with seq = , ack = checksum = "
then send the packet to the A side using the tolayer3

Test Cases

Test case 1

----- Stop and Wait Network Simulator Version 1.1 --------

Enter the number of messages to simulate: 10
Enter packet loss probability [enter 0.0 for no loss]:0.0
Enter packet corruption probability [0.0 for no corruption]:0.0
Enter average time between messages from sender's layer5 [> 0.0]:5.0
Enter TRACE:0
A: sending a packet with seq = 0 ack = 0 with data = aaaaaaaaaaaaaaaaaaaa , checksum = 1940

B: Received packet with seq = 0 , ack = 0 data: aaaaaaaaaaaaaaaaaaaa , checksum = 1940

B: saving data : aaaaaaaaaaaaaaaaaaaa

B: sending Acknowledgment with seq = 0 , ack = 0 checksum = 0

A: Can't send this data 'bbbbbbbbbbbbbbbbbbbb' , there's an unacknowledged packet

A: An ACK packet with seq = 0 ack = 0 and checksum = 0 is received

A: sending a packet with seq = 1 ack = 0 with data = cccccccccccccccccccc , checksum = 1981

A: Can't send this data 'dddddddddddddddddddd' , there's an unacknowledged packet

B: Received packet with seq = 1 , ack = 0 data: cccccccccccccccccccc , checksum = 1981

B: saving data : cccccccccccccccccccc

B: sending Acknowledgment with seq = 1 , ack = 0 checksum = 1

A: Can't send this data 'eeeeeeeeeeeeeeeeeeee' , there's an unacknowledged packet

A: An ACK packet with seq = 1 ack = 0 and checksum = 1 is received

A: sending a packet with seq = 0 ack = 0 with data = ffffffffffffffffffff , checksum = 2040

B: Received packet with seq = 0 , ack = 0 data: ffffffffffffffffffff , checksum = 2040

B: saving data : fffffffffffffffffff

B: sending Acknowledgment with seq = 0 , ack = 0 checksum = 0

A: Can't send this data 'gggggggggggggggggggg' , there's an unacknowledged packet

A: Can't send this data 'hhhhhhhhhhhhhhhhhhhh' , there's an unacknowledged packet

A: An ACK packet with seq = 0 ack = 0 and checksum = 0 is received

A: sending a packet with seq = 1 ack = 0 with data = iiiiiiiiiiiiiiiiiiii , checksum = 2101

A: Can't send this data 'jjjjjjjjjjjjjjjjjjjj' , there's an unacknowledged packet

 Simulator terminated at time 69.602814
 after sending 10 msgs from layer5

Test case 2

----- Stop and Wait Network Simulator Version 1.1 --------

Enter the number of messages to simulate: 50
Enter packet loss probability [enter 0.0 for no loss]:0.3
Enter packet corruption probability [0.0 for no corruption]:0.0
Enter average time between messages from sender's layer5 [> 0.0]:10.0
Enter TRACE:0
A: sending a packet with seq = 0 ack = 0 with data = aaaaaaaaaaaaaaaaaaaa , checksum = 1940

A: Can't send this data 'bbbbbbbbbbbbbbbbbbbb' , there's an unacknowledged packet

A: Timer goes off

A: Resending packet with seq = 0 ack = 0 data: aaaaaaaaaaaaaaaaaaaa , checksum = 1940

A: Can't send this data 'cccccccccccccccccccc' , there's an unacknowledged packet

A: Can't send this data 'dddddddddddddddddddd' , there's an unacknowledged packet

B: Received packet with seq = 0 , ack = 0 data: aaaaaaaaaaaaaaaaaaaa , checksum = 1940

B: saving data : aaaaaaaaaaaaaaaaaaaa

B: sending Acknowledgment with seq = 0 , ack = 0 checksum = 0

A: Can't send this data 'eeeeeeeeeeeeeeeeeeeee' , there's an unacknowledged packet

Warning: unable to cancel your timer. It wasn't running.
A: An ACK packet with seq = 0 ack = 0 and checksum = 0 is received

A: sending a packet with seq = 1 ack = 0 with data = ffffffffffffffffffff , checksum = 2041

B: Received packet with seq = 1 , ack = 0 data: ffffffffffffffffffff , checksum = 2041

B: saving data : ffffffffffffffffffff

B: sending Acknowledgment with seq = 1 , ack = 0 checksum = 1

A: An ACK packet with seq = 1 ack = 0 and checksum = 1 is received

A: sending a packet with seq = 0 ack = 0 with data = gggggggggggggggggggg , checksum = 2060

B: Received packet with seq = 0 , ack = 0 data: gggggggggggggggggggg , checksum = 2060

B: saving data : gggggggggggggggggggg

B: sending Acknowledgment with seq = 0 , ack = 0 checksum = 0

A: Can't send this data 'hhhhhhhhhhhhhhhhhhhh' , there's an unacknowledged packet

A: Timer goes off

A: Resending packet with seq = 0 ack = 0 data: gggggggggggggggggggg , checksum = 2060

B: Received packet with seq = 0 ack = 0 data: gggggggggggggggggggg , checksum = 2060

B: packet is out of order

B: sending acknowledgment of last received packet with seq = 0 , ack = 0 checksum = 0

A: Can't send this data 'iiiiiiiiiiiiiiiiiiii' , there's an unacknowledged packet

Warning: unable to cancel your timer. It wasn't running.
A: An ACK packet with seq = 0 ack = 0 and checksum = 0 is received

A: sending a packet with seq = 1 ack = 0 with data = jjjjjjjjjjjjjjjjjjjjjj , checksum = 2121

A: Can't send this data 'kkkkkkkkkkkkkkkkkkkkk' , there's an unacknowledged packet

A: Timer goes off

A: Resending packet with seq = 1 ack = 0 data: jjjjjjjjjjjjjjjjjjjjjj , checksum = 2121

A: Can't send this data 'llllllllllllllllllll' , there's an unacknowledged packet

A: Can't send this data 'mmmmmmmmmmmmmmmmmmmmm' , there's an unacknowledged packet

A: Can't send this data 'nnnnnnnnnnnnnnnnnnnnn' , there's an unacknowledged packet

A: Can't send this data 'ooooooooooooooooooooo' , there's an unacknowledged packet

A: Can't send this data 'ppppppppppppppppppppp' , there's an unacknowledged packet

A: Can't send this data 'qqqqqqqqqqqqqqqqqqqqq' , there's an unacknowledged packet

A: Can't send this data 'rrrrrrrrrrrrrrrrrrrrr' , there's an unacknowledged packet

A: Can't send this data 'sssssssssssssssssssss' , there's an unacknowledged packet

A: Can't send this data 'ttttttttttttttttttttt' , there's an unacknowledged packet

A: Can't send this data 'uuuuuuuuuuuuuuuuuuuuu' , there's an unacknowledged packet

A: Can't send this data 'vvvvvvvvvvvvvvvvvvvvv' , there's an unacknowledged packet

A: Can't send this data 'wwwwwwwwwwwwwwwwwwwww' , there's an unacknowledged packet

A: Can't send this data 'xxxxxxxxxxxxxxxxxxxxx' , there's an unacknowledged packet

A: Can't send this data 'yyyyyyyyyyyyyyyyyyyyy' , there's an unacknowledged packet

A: Can't send this data 'zzzzzzzzzzzzzzzzzzzzz' , there's an unacknowledged packet

A: Can't send this data 'aaaaaaaaaaaaaaaaaaaaa' , there's an unacknowledged packet

A: Can't send this data 'bbbbbbbbbbbbbbbbbbbbb' , there's an unacknowledged packet

A: Can't send this data 'cccccccccccccccccccccc' , there's an unacknowledged packet

A: Can't send this data 'dddddddddddddddddddd' , there's an unacknowledged packet

A: Can't send this data 'eeeeeeeeeeeeeeeeeeeeeee' , there's an unacknowledged packet

A: Can't send this data 'fffffffffffffffffff' , there's an unacknowledged packet

A: Can't send this data 'ggggggggggggggggggggg' , there's an unacknowledged packet

A: Can't send this data 'hhhhhhhhhhhhhhhhhhhh' , there's an unacknowledged packet

A: Can't send this data 'iiiiiiiiiiiiiiiiiiii' , there's an unacknowledged packet

A: Can't send this data 'jjjjjjjjjjjjjjjjjjjj' , there's an unacknowledged packet

A: Can't send this data 'kkkkkkkkkkkkkkkkkkkk' , there's an unacknowledged packet

A: Can't send this data 'llllllllllllllllllll' , there's an unacknowledged packet

A: Can't send this data 'mmmmmmmmmmmmmmmmmmmm' , there's an unacknowledged packet

A: Can't send this data 'nnnnnnnnnnnnnnnnnnnn' , there's an unacknowledged packet

A: Can't send this data 'oooooooooooooooooooo' , there's an unacknowledged packet

A: Can't send this data 'pppppppppppppppppppp' , there's an unacknowledged packet

A: Can't send this data 'qqqqqqqqqqqqqqqqqqqq' , there's an unacknowledged packet

A: Can't send this data 'rrrrrrrrrrrrrrrrrrrr' , there's an unacknowledged packet

A: Can't send this data 'ssssssssssssssssssss' , there's an unacknowledged packet

A: Can't send this data 'tttttttttttttttttttt' , there's an unacknowledged packet

A: Can't send this data 'uuuuuuuuuuuuuuuuuuuu' , there's an unacknowledged packet

A: Can't send this data 'vvvvvvvvvvvvvvvvvvvv' , there's an unacknowledged packet

A: Can't send this data 'wwwwwwwwwwwwwwwwwwww' , there's an unacknowledged packet

A: Can't send this data 'xxxxxxxxxxxxxxxxxxxxx' , there's an unacknowledged packet

 Simulator terminated at time 519.488220
 after sending 50 msgs from layer5

Test case 3

----- Stop and Wait Network Simulator Version 1.1 --------

Enter the number of messages to simulate: 10
Enter packet loss probability [enter 0.0 for no loss]:0.0
Enter packet corruption probability [0.0 for no corruption]:0.3
Enter average time between messages from sender's layer5 [> 0.0]:10.0
Enter TRACE:0
A: sending a packet with seq = 0 ack = 0 with data = aaaaaaaaaaaaaaaaaaaa , checksum = 1940

B: Received packet with seq = 0 , ack = 0 data: aaaaaaaaaaaaaaaaaaaa , checksum = 1940

B: saving data : aaaaaaaaaaaaaaaaaaaa

B: sending Acknowledgment with seq = 0 , ack = 0 checksum = 0

A: An ACK packet with seq = 0 ack = 0 and checksum = 0 is received

A: sending a packet with seq = 1 ack = 0 with data = bbbbbbbbbbbbbbbbbbbb , checksum = 1961

B: Received packet with seq = 1 ack = 999999 data: bbbbbbbbbbbbbbbbbbbb , checksum = 1961

B: packet is corrupt

B: sending Non acknowledgment with seq = 1 , ack = 1 checksum = 2

A: Can't send this data 'cccccccccccccccccccc' , there's an unacknowledged packet

A: An Non-ACK packet with seq = 1 ack = 1 and checksum = 2 is received

A: Resending packet with seq = 1 ack = 0 data: bbbbbbbbbbbbbbbbbbbb , checksum = 1961

B: Received packet with seq = 1 , ack = 0 data: bbbbbbbbbbbbbbbbbbbb , checksum = 1961

B: saving data : bbbbbbbbbbbbbbbbbbbb

B: sending Acknowledgment with seq = 1 , ack = 0 checksum = 1

A: An ACK packet with seq = 1 ack = 0 and checksum = 1 is received

A: sending a packet with seq = 0 ack = 0 with data = dddddddddddddddddddd , checksum = 2000

A: Can't send this data 'eeeeeeeeeeeeeeeeeeee' , there's an unacknowledged packet

B: Received packet with seq = 0 , ack = 0 data: dddddddddddddddddddd , checksum = 2000

B: saving data : dddddddddddddddddddd

B: sending Acknowledgment with seq = 0 , ack = 0 checksum = 0

A: Can't send this data 'ffffffffffffffffffff' , there's an unacknowledged packet

A: Can't send this data 'gggggggggggggggggggg' , there's an unacknowledged packet

A: Can't send this data 'hhhhhhhhhhhhhhhhhhhh' , there's an unacknowledged packet

A: Can't send this data 'iiiiiiiiiiiiiiiiiiii' , there's an unacknowledged packet

A: Can't send this data 'jjjjjjjjjjjjjjjjjjjj' , there's an unacknowledged packet

Simulator terminated at time 121.612900
after sending 10 msgs from layer5

The Go Back N Protocol

Assumptions

When the A side receives a non acknowledgement it does nothing instead it waits for the the time interrupt to handle it.

The Code

The code to this protocol is attached to this report in the file named 16P8100_GBN.c

The Implementation

The global variables

integer windowsize represents the N (the window size) set to 8
pkt buffer[100] array of packets representing the buffer initialized to void
integer buffer_counter the counter tells where in the buffer to store the next packet initialized 0
integer a_seq represents the expected sequence number in the A side, initialized by 0
integer a_ack represents the expected Acknowledgement number in the A side, initialized by 0
integer b_seq represents the expected sequence number in the B side, initialized by 0
integer b_ack represents the expected Acknowledgement number in the B side, initialized by 0
integer start represents the start of the window in the buffer
float incerement represents the increment used in the timer (starttimer())

A_output

First this function checks if the buffer isn't full and if this message will be within the boundaries of the window, if so then it creates a packet with seqnum = a_seq and acknum = a_ack and the payload is the data from the message passed in, lastly, the checksum is calculated the same way as in the Alternating bit protocol , then it makes a copy of it saving it in the buffer then sends the packet with the tolayer3 function, then it increments the a_seq and a_ack.
If the packet is outside the window (but less than 100) then the function saves the packet in the buffer only.

A_input

First it checks if the received checksum is the same s the expected checksum (same as AB)
Then, it checks if acknum of the received packet is in the interval of seqnum of first packet in the window and the seqnum of the last packet in the window.

If so then it prints "A: Received Acknowledgement with seq = ack = checksum = the window now starts at "
And then it increments start by the number of packets acknowledged.
Otherwise it prints "A: Received Non-Acknowledgement with seq = ack = "

A_timerinterrupt

First it prints to the user "A: Time is up resending all packets in the window" then it resends all the packets in the window.

B_input

The function starts with checking the received checksum and the calculated checksum if they are equal it checks if the packet is in order (if seqnum = b_seq)
If these conditions are true then this packet is not corrupt and is in order then it sends to the other side an Acknowledgement (seqnum = acknum = seq of received packet) after it increments the b_seq and b_ack and saves the data using tolayer5 and prints :
"B: Received packet with seq = , ack = data: , checksum = "
" B: Sending to Application layer this data : "
"B: sending Acknowledgment with seq = , ack = checksum = "
Otherwise then the packet is either corrupted or out of order then it sends a Non-Acknowledgement (seqnum = b_seq acknum = b_ack) using tolayer3

Test Cases

Test Case 1

----- Stop and Wait Network Simulator Version 1.1 --------

Enter the number of messages to simulate: 10
Enter packet loss probability [enter 0.0 for no loss]:0.0
Enter packet corruption probability [0.0 for no corruption]:0.0
Enter average time between messages from sender's layer5 [> 0.0]:5.0
Enter TRACE:0
A: buffering message with data: aaaaaaaaaaaaaaaaaaaa

A: sending packet with seq = 0 ack = 0 data: aaaaaaaaaaaaaaaaaaaa checksum = 1940

A: Starting the window time

B: Received packet with seq = 0 , ack = 0 data: aaaaaaaaaaaaaaaaaaaa , checksum = 1940

B: Sending to Application layer this data : aaaaaaaaaaaaaaaaaaaa

B: sending Acknowledgment with seq = 0 , ack = 0 checksum = 0

A: buffering message with data: bbbbbbbbbbbbbbbbbbbb

A: sending packet with seq = 20 ack = 0 data: bbbbbbbbbbbbbbbbbbbb checksum = 1980

A: Recieved Acknowledgement with seq = 0 ack = 0 checksum = 0 the window now starts at 1

A: buffering message with data: cccccccccccccccccccc

A: sending packet with seq = 40 ack = 20 data: cccccccccccccccccccc checksum = 2040

A: buffering message with data: dddddddddddddddddddd

A: sending packet with seq = 60 ack = 40 data: dddddddddddddddddddd checksum = 2100

B: Received packet with seq = 20 , ack = 0 data: bbbbbbbbbbbbbbbbbbbb , checksum = 1980

B: Sending to Application layer this data : bbbbbbbbbbbbbbbbbbbb

B: sending Acknowledgment with seq = 20 , ack = 20 checksum = 40

A: buffering message with data: eeeeeeeeeeeeeeeeeeee

A: sending packet with seq = 80 ack = 60 data: eeeeeeeeeeeeeeeeeeee checksum = 2160

A: Recieved Acknowledgement with seq = 20 ack = 20 checksum = 40 the window now starts at 2

Warning: unable to cancel your timer. It wasn't running.
B: Received packet with seq = 40 , ack = 20 data: cccccccccccccccccccc , checksum = 2040

B: Sending to Application layer this data : cccccccccccccccccccc

B: sending Acknowledgment with seq = 40 , ack = 40 checksum = 80

A: buffering message with data: ffffffffffffffffffff

A: sending packet with seq = 100 ack = 80 data: ffffffffffffffffffff checksum = 2220

B: Received packet with seq = 60 , ack = 40 data: dddddddddddddddddddd , checksum = 2100

B: Sending to Application layer this data : dddddddddddddddddddd

B: sending Acknowledgment with seq = 60 , ack = 60 checksum = 120

A: Recieved Acknowledgement with seq = 40 ack = 40 checksum = 80 the window now starts at 3

Warning: unable to cancel your timer. It wasn't running.
A: buffering message with data: gggggggggggggggggggg

A: sending packet with seq = 120 ack = 100 data: gggggggggggggggggggg checksum = 2280

B: Received packet with seq = 80 , ack = 60 data: eeeeeeeeeeeeeeeeeeee , checksum = 2160

B: Sending to Application layer this data : eeeeeeeeeeeeeeeeeeee

B: sending Acknowledgment with seq = 80 , ack = 80 checksum = 160

A: buffering message with data: hhhhhhhhhhhhhhhhhhhh

A: sending packet with seq = 140 ack = 120 data: hhhhhhhhhhhhhhhhhhhh checksum = 2340

A: Recieved Acknowledgement with seq = 60 ack = 60 checksum = 120 the window now starts at 4

Warning: unable to cancel your timer. It wasn't running.
A: Recieved Acknowledgement with seq = 80 ack = 80 checksum = 160 the window now starts at 5

Warning: unable to cancel your timer. It wasn't running.
A: buffering message with data: iiiiiiiiiiiiiiiiiiii

A: sending packet with seq = 160 ack = 140 data: iiiiiiiiiiiiiiiiiiii checksum = 2400

B: Received packet with seq = 100 , ack = 80 data: ffffffffffffffffffff , checksum = 2220

B: Sending to Application layer this data : ffffffffffffffffffff

B: sending Acknowledgment with seq = 100 , ack = 100 checksum = 200

A: buffering message with data: jjjjjjjjjjjjjjjjjjjj

A: sending packet with seq = 180 ack = 160 data: jjjjjjjjjjjjjjjjjjjj checksum = 2460

 Simulator terminated at time 60.838638
 after sending 10 msgs from layer5

Test Case 2

----- Stop and Wait Network Simulator Version 1.1 --------

Enter the number of messages to simulate: 50
Enter packet loss probability [enter 0.0 for no loss]:0.3
Enter packet corruption probability [0.0 for no corruption]:0.0
Enter average time between messages from sender's layer5 [> 0.0]:10.0
Enter TRACE:0
A: buffering message with data: aaaaaaaaaaaaaaaaaaaa

A: sending packet with seq = 0 ack = 0 data: aaaaaaaaaaaaaaaaaaaa checksum = 1940

A: Starting the window time

A: buffering message with data: bbbbbbbbbbbbbbbbbbbb

A: sending packet with seq = 20 ack = 0 data: bbbbbbbbbbbbbbbbbbbb checksum = 1980

B: Received packet with seq = 20 , ack = 0 data: bbbbbbbbbbbbbbbbbbbb , checksum = 1980 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 0 and ack = 0

A: buffering message with data: cccccccccccccccccccc

A: sending packet with seq = 40 ack = 20 data: cccccccccccccccccccc checksum = 2040

A: buffering message with data: dddddddddddddddddddd

A: sending packet with seq = 60 ack = 40 data: dddddddddddddddddddd checksum = 2100

B: Received packet with seq = 40 , ack = 20 data: cccccccccccccccccccc , checksum = 2040 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 0 and ack = 20

A: buffering message with data: eeeeeeeeeeeeeeeeeeee

A: sending packet with seq = 80 ack = 60 data: eeeeeeeeeeeeeeeeeeee checksum = 2160

A: buffering message with data: ffffffffffffffffffff

A: sending packet with seq = 100 ack = 80 data: ffffffffffffffffffff checksum = 2220

B: Received packet with seq = 60 , ack = 40 data: dddddddddddddddddddd , checksum = 2100 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 0 and ack = 40

A: Recieved Non-Acknowledgement with seq = 0 ack = 20

B: Received packet with seq = 80 , ack = 60 data: eeeeeeeeeeeeeeeeeeee , checksum = 2160 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 0 and ack = 60

A: Recieved Non-Acknowledgement with seq = 0 ack = 40

A: buffering message with data: gggggggggggggggggggg

A: sending packet with seq = 120 ack = 100 data: gggggggggggggggggggg checksum = 2280

A: buffering message with data: hhhhhhhhhhhhhhhhhhhh

A: sending packet with seq = 140 ack = 120 data: hhhhhhhhhhhhhhhhhhhh checksum = 2340

A: Recieved Non-Acknowledgement with seq = 0 ack = 60

B: Received packet with seq = 120 , ack = 100 data: gggggggggggggggggggg , checksum = 2280 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 0 and ack = 100

A: Recieved Non-Acknowledgement with seq = 0 ack = 100

A: buffering message with data: iiiiiiiiiiiiiiiiiiii

A: Can't send this message as the window is full

A: buffering message with data: jjjjjjjjjjjjjjjjjjjj

A: Can't send this message as the window is full

A: buffering message with data: kkkkkkkkkkkkkkkkkkkk

A: Can't send this message as the window is full

A: buffering message with data: llllllllllllllllllll

A: Can't send this message as the window is full

A: buffering message with data: mmmmmmmmmmmmmmmmmmmm

A: Can't send this message as the window is full

A: buffering message with data: nnnnnnnnnnnnnnnnnnnn

A: Can't send this message as the window is full

A: buffering message with data: oooooooooooooooooooo

A: Can't send this message as the window is full

A: buffering message with data: pppppppppppppppppppp

A: Can't send this message as the window is full

A: buffering message with data: qqqqqqqqqqqqqqqqqqqq

A: Can't send this message as the window is full

A: buffering message with data: rrrrrrrrrrrrrrrrrrrr

A: Can't send this message as the window is full

A: buffering message with data: ssssssssssssssssssss

A: Can't send this message as the window is full

A: Time is up resending all packets in the window

A: sending packet with seq = 0 ack = 0 data: aaaaaaaaaaaaaaaaaaaa checksum = 1940

A: sending packet with seq = 20 ack = 0 data: bbbbbbbbbbbbbbbbbbbb checksum = 1980

A: sending packet with seq = 40 ack = 20 data: cccccccccccccccccccc checksum = 2040

A: sending packet with seq = 60 ack = 40 data: dddddddddddddddddddd checksum = 2100

A: sending packet with seq = 80 ack = 60 data: eeeeeeeeeeeeeeeeeeee checksum = 2160

A: sending packet with seq = 100 ack = 80 data: ffffffffffffffffffff checksum = 2220

A: sending packet with seq = 120 ack = 100 data: gggggggggggggggggggg checksum = 2280

A: sending packet with seq = 140 ack = 120 data: hhhhhhhhhhhhhhhhhhhh checksum = 2340

B: Received packet with seq = 0 , ack = 0 data: aaaaaaaaaaaaaaaaaaaa , checksum = 1940

B: Sending to Application layer this data : aaaaaaaaaaaaaaaaaaaa

B: sending Acknowledgment with seq = 0 , ack = 0 checksum = 0

A: buffering message with data: tttttttttttttttttttt

A: Can't send this message as the window is full

A: Recieved Acknowledgement with seq = 0 ack = 0 checksum = 0 the window now starts at 1

Warning: unable to cancel your timer. It wasn't running.
B: Received packet with seq = 40 , ack = 20 data: cccccccccccccccccccc , checksum = 2040 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 20 and ack = 20

A: Recieved Non-Acknowledgement with seq = 20 ack = 20

B: Received packet with seq = 80 , ack = 60 data: eeeeeeeeeeeeeeeeeeee , checksum = 2160 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 20 and ack = 60

A: buffering message with data: uuuuuuuuuuuuuuuuuuuu

A: Can't send this message as the window is full

B: Received packet with seq = 100 , ack = 80 data: ffffffffffffffffffff , checksum = 2220 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 20 and ack = 80

A: buffering message with data: vvvvvvvvvvvvvvvvvvvv

A: Can't send this message as the window is full

A: Recieved Non-Acknowledgement with seq = 20 ack = 60

A: Recieved Non-Acknowledgement with seq = 20 ack = 80

A: buffering message with data: wwwwwwwwwwwwwwwwwwww

A: Can't send this message as the window is full

A: buffering message with data: xxxxxxxxxxxxxxxxxxxx

A: Can't send this message as the window is full

A: buffering message with data: yyyyyyyyyyyyyyyyyyyy

A: Can't send this message as the window is full

A: buffering message with data: zzzzzzzzzzzzzzzzzzzz

A: Can't send this message as the window is full

A: buffering message with data: aaaaaaaaaaaaaaaaaaaa

A: Can't send this message as the window is full

A: buffering message with data: bbbbbbbbbbbbbbbbbbbb

A: Can't send this message as the window is full

A: buffering message with data: cccccccccccccccccccc

A: Can't send this message as the window is full

A: buffering message with data: dddddddddddddddddddd

A: Can't send this message as the window is full

A: buffering message with data: eeeeeeeeeeeeeeeeeeee

A: Can't send this message as the window is full

A: buffering message with data: ffffffffffffffffffff

A: Can't send this message as the window is full

A: buffering message with data: gggggggggggggggggggg

A: Can't send this message as the window is full

A: buffering message with data: hhhhhhhhhhhhhhhhhhhh

A: Can't send this message as the window is full

A: buffering message with data: iiiiiiiiiiiiiiiiiiii

A: Can't send this message as the window is full

A: buffering message with data: jjjjjjjjjjjjjjjjjjjj

A: Can't send this message as the window is full

A: buffering message with data: kkkkkkkkkkkkkkkkkkkk

A: Can't send this message as the window is full

A: buffering message with data: llllllllllllllllllll

A: Can't send this message as the window is full

A: buffering message with data: mmmmmmmmmmmmmmmmmmmm

A: Can't send this message as the window is full

A: buffering message with data: nnnnnnnnnnnnnnnnnnnn

A: Can't send this message as the window is full

A: buffering message with data: oooooooooooooooooooo

A: Can't send this message as the window is full

A: buffering message with data: pppppppppppppppppppp

A: Can't send this message as the window is full

A: buffering message with data: qqqqqqqqqqqqqqqqqqqq

A: Can't send this message as the window is full

A: buffering message with data: rrrrrrrrrrrrrrrrrrrr

A: Can't send this message as the window is full

A: buffering message with data: ssssssssssssssssssss

A: Can't send this message as the window is full

A: buffering message with data: tttttttttttttttttttt

A: Can't send this message as the window is full

A: buffering message with data: uuuuuuuuuuuuuuuuuuuu

A: Can't send this message as the window is full

A: buffering message with data: vvvvvvvvvvvvvvvvvvvv

A: Can't send this message as the window is full

A: buffering message with data: wwwwwwwwwwwwwwwwwwww

A: Can't send this message as the window is full

A: buffering message with data: xxxxxxxxxxxxxxxxxxxx

A: Can't send this message as the window is full

Simulator terminated at time 519.242310
after sending 50 msgs from layer5

Test Case 3

----- Stop and Wait Network Simulator Version 1.1 --------

Enter the number of messages to simulate: 10
Enter packet loss probability [enter 0.0 for no loss]:0.0
Enter packet corruption probability [0.0 for no corruption]:0.3
Enter average time between messages from sender's layer5 [> 0.0]:10.0
Enter TRACE:0
A: buffering message with data: aaaaaaaaaaaaaaaaaaaa

A: sending packet with seq = 0 ack = 0 data: aaaaaaaaaaaaaaaaaaaa checksum = 1940

A: Starting the window time

B: Received packet with seq = 0 , ack = 0 data: aaaaaaaaaaaaaaaaaaaa , checksum = 1940

B: Sending to Application layer this data : aaaaaaaaaaaaaaaaaaaa

B: sending Acknowledgment with seq = 0 , ack = 0 checksum = 0

A: Recieved Acknowledgement with seq = 0 ack = 0 checksum = 0 the window now starts at 1

A: buffering message with data: bbbbbbbbbbbbbbbbbbbb

A: sending packet with seq = 20 ack = 0 data: bbbbbbbbbbbbbbbbbbbb checksum = 1980

A: Starting the window time

B: Received packet with seq = 20 , ack = 999999 data: bbbbbbbbbbbbbbbbbbbb , checksum = 1980 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 20 and ack = 0

A: buffering message with data: cccccccccccccccccccc

A: sending packet with seq = 40 ack = 20 data: cccccccccccccccccccc checksum = 2040

B: Received packet with seq = 40 , ack = 20 data: cccccccccccccccccccc , checksum = 2040 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 20 and ack = 20

A: Recieved Non-Acknowledgement with seq = 20 ack = 0

A: Recieved Non-Acknowledgement with seq = 20 ack = 20

A: buffering message with data: dddddddddddddddddddd

A: sending packet with seq = 60 ack = 40 data: dddddddddddddddddddd checksum = 2100

A: buffering message with data: eeeeeeeeeeeeeeeeeeee

A: sending packet with seq = 80 ack = 60 data: eeeeeeeeeeeeeeeeeeee checksum = 2160

B: Received packet with seq = 60 , ack = 40 data: dddddddddddddddddddd , checksum = 2100 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 20 and ack = 40

A: Recieved Non-Acknowledgement with seq = 20 ack = 40

B: Received packet with seq = 80 , ack = 999999 data: eeeeeeeeeeeeeeeeeeee , checksum = 2160 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 20 and ack = 60

A: buffering message with data: ffffffffffffffffffff

A: sending packet with seq = 100 ack = 80 data: ffffffffffffffffffff checksum = 2220

A: Recieved Non-Acknowledgement with seq = 20 ack = 60

B: Received packet with seq = 100 , ack = 80 data: Zfffffffffffffffffff , checksum = 2220 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 20 and ack = 80

A: Recieved Non-Acknowledgement with seq = 999999 ack = 80

A: buffering message with data: gggggggggggggggggggg

A: sending packet with seq = 120 ack = 100 data: gggggggggggggggggggg checksum = 2280

B: Received packet with seq = 120 , ack = 100 data: gggggggggggggggggggg , checksum = 2280 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 20 and ack = 100

A: buffering message with data: hhhhhhhhhhhhhhhhhhhh

A: sending packet with seq = 140 ack = 120 data: hhhhhhhhhhhhhhhhhhhh checksum = 2340

B: Received packet with seq = 140 , ack = 120 data: hhhhhhhhhhhhhhhhhhhh , checksum = 2340 is either out of order or corrupt

B: Sending Non Acknowledgement with seq = 20 and ack = 120

A: Recieved Non-Acknowledgement with seq = 20 ack = 999999

A: Recieved Non-Acknowledgement with seq = 20 ack = 120

A: buffering message with data: iiiiiiiiiiiiiiiiiiii

A: sending packet with seq = 160 ack = 140 data: iiiiiiiiiiiiiiiiiiii checksum = 2400

A: buffering message with data: jjjjjjjjjjjjjjjjjjjj

A: Can't send this message as the window is full

 Simulator terminated at time 123.433060
 after sending 10 msgs from layer5