CN ASSIGNMENT 3

(Group No 3)

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Go-Back-N Protocol

Packet Transmission:

On both sides, data entity 1 (server) and data entity 2 (client), data is sent as packets, received at the peer end, ack is sent from the peer end, and received back. To demonstrate how this process works, certain print statements were added. Below is the received output when one terminal acts as the server side and the other one as the client side.

```
[server] Timeout! Retransmitting frames.
[server] Sent packet: 84 with Seq 3
[server] Generated Packet: 85 with Seq 4
[server] Timeout! Retransmitting frames.
[server] Dropped frame with Seq 4
[server] Out-of-order frame Seq 4, expected Seq 6
[server] Sent ACK for Seq 5
[server] Generated Packet: 86 with Seq 5
[server] Generated Packet: 87 with Seq 6
[server] Timeout! Retransmitting frames.
[server] Sent packet: 86 with Seq 5
[server] Out-of-order frame Seq 5, expected Seq 6
[server] Sent ACK for Seq 5
[server] Generated Packet: 88 with Seq 7
[server] Timeout! Retransmitting frames.
[server] Sent packet: 87 with Seq 6
[server] Timeout! Retransmitting frames.
[server] Sent packet: 88 with Seq 7
[server] ACK received for Seq 7, base updated to 0
```

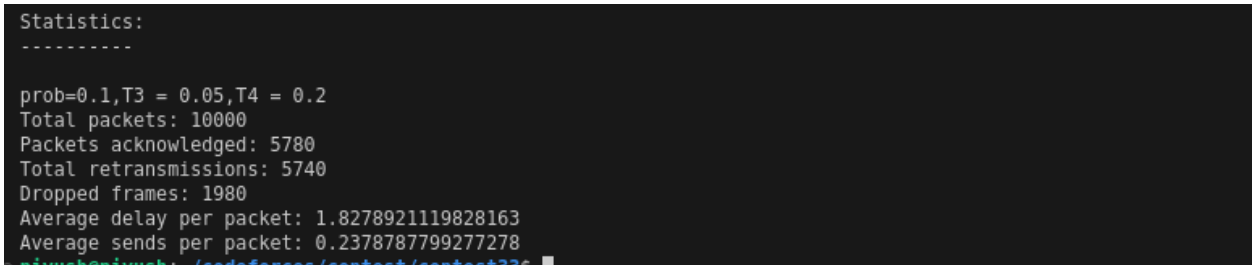
```
[client] Sent ACK for Seq 6
[client] Timeout! Retransmitting frames.
[client] Sent packet: 75 with Seq 2
[client] Generated Packet: 76 with Seq 3
[client] Timeout! Retransmitting frames.
[client] Sent packet: 76 with Seq 3
[client] Generated Packet: 77 with Seq 4
[client] Timeout! Retransmitting frames.
[client] Sent packet: 77 with Seq 4
[client] Generated Packet: 78 with Seq 5
[client] Sent packet: 78 with Seq 5
[client] Generated Packet: 79 with Seq 6
[client] Timeout! Retransmitting frames.
[client] Dropped frame with Seq 4
[client] Sent packet: 79 with Seq 6
[client] Generated Packet: 80 with Seq 7
[client] Received: 80 with Seq 7
[client] Dropped ACK for Seq 7
[client] Generated Packet: 81 with Seq 0
```

- **Generated Packet: {packet_num} with Seq {seq_num}**: This indicates that the entity (either Client or Server) has generated a new packet with the given packet number (packet_num) and sequence number (seq_num).
- **[{entity_name}] Dropped frame with Seq {seq_num}**: This indicates that a frame with a specific sequence number (seq_num) was randomly dropped due to the DROP_PROBABILITY.
- **[{entity_name}] Sent packet: {packet_num} with Seq {seq_num}**: This indicates that the entity has successfully sent a packet (packet_num) with the sequence number (seq_num).

- **[{entity_name}] ACK received for Seq {ack_no}, base updated to {base}**: This indicates that the entity has received an acknowledgment (ACK) for a sequence number (ack_no). The base value, which tracks the last acknowledged packet, is updated accordingly.
- **[{entity_name}] Timeout! Retransmitting frames**: This indicates that a timeout occurred (i.e., no ACK was received for a sent packet), so the entity is retransmitting the frames that were not acknowledged.
- **[{entity_name}] Sent ACK for Seq {ack_no}**: This indicates that the entity has sent an acknowledgment (ACK) for a specific sequence number (ack_no), confirming receipt of a frame.
- **[{entity_name}] Received: {packet_num} with Seq {seq_num}**: This indicates that the entity has successfully received a frame with the specified packet number (packet_num) and sequence number (seq_num).
- **[{entity_name}] Out-of-order frame Seq {seq_num}, expected Seq {expected_seq_num}**: This indicates that the entity has received a frame with a sequence number (seq_num) that does not match the expected sequence number (expected_seq_num), meaning the frame was out of order.

Statistics:

A) Keep the T3=0.05 and T4=0.2 and change the probability from 0.1 to 0.6.



```
prob=0.6,T3 = 0.05,T4 = 0.2
Total packets: 10000
Packets acknowledged: 790
Total retransmissions: 5880
Dropped frames: 3330
Average delay per packet: 12.1239724199028163
Average sends per packet: 0.5088575096277278
```

This shows that increasing the drop probability decreases the number of acks since more packets are being dropped.

B) Keeping the Probability=0.1 and changing T3 and T4 from T3=0.00 and T4=0.1 to T3=0.05 and T4=0.2

```
Statistics:
----------

prob=0.1,T3 = 0.00,T4 = 0.1
Total packets: 10000
Packets acknowledged: 7960
Total retransmissions: 5360
Dropped frames: 1340
Average delay per packet: 1.2337990009228183
Average sends per packet: 0.1278780899299278
```

```
Statistics:
----------

prob=0.1,T3 = 0.05,T4 = 0.2
Total packets: 10000
Packets acknowledged: 5780
Total retransmissions: 5740
Dropped frames: 1980
Average delay per packet: 1.8278921119828163
Average sends per packet: 0.2378787799277278
```