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Lebanese American University
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CSC 634: Networks Programming
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Programming Assignment # 1
Go-Back-N Protocol Simulator

Due: February 20, 2018

Problem Description

Simulate the *Go-Back-N* reliable transport protocol, which uses both UDP and TCP; UDP for packet transfer and TCP for ACK packet exchange. For example, a sender sends a packet of size S with a window of size W ($W \times S$ bytes) to a receiver using UDP, and then the sender receives an ACK for the packet using TCP connection set up between them. The demonstrator provides controllability over the packet and window sizes.

More specifically:

- Assume that there is no bit-error in the network (error-free). So, you do not implement error-checking nor error-recovering.
- There will be artificial packet loss at receiver side, so there should be a re-transmission timer.
- There will be congestion and you will need to implement control flow;
- The artificial packet loss will be achieved by discarding an incoming packet and not sending back the corresponding ACK.
- There will be artificial premature timeout by setting the timer with zero. When timeout occurs, the sender resends the packet, so the packet should be buffered in the window at sender side.
- Duplicate packets need to be handled properly at the receiver side.
- Out-of-order packet delivery is unlikely to happen. However, it is still your responsibility to provide in-order delivery.
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Requirements

Implement the above simulator without using networking. That is the simulator will simulate a sender and a receiver as follows:

1. Implementing an internal clock;
2. Sending data from a client to a server by negotiating a window size, creating the necessary packets and then sending the packets;
3. Packets should have sequence numbers and properly acknowledged;
4. Simulating network losses due to unforeseen events. Your simulator should be able to recover.
5. The simulator should work as follows:
`GoBackN <file> <congestion probability> <packet loss probability>`

Submission Details

Upload your source code to your private GitHub repo. Include a report that explains your simulation and how the above issues were handled. Also include a results discussion section, proposing any improvements for your simulator.