5. Reliable Packet Service over TCP

In this assignment, you are instructed to develop a program in C using the TCP APIs which will implement a reliable packet service with selective rebroadcast on top of TCP (though TCP has this functionality built in, we aim to simulate using TCP. Intention is to make you thorough with concurrency handling at socket level. We felt that you guy have not done enough in the last assignment, hence this assignment). The assignment will use selective repeat with multiple packets acknowledged per ACK packet. You will use a window size of W bits, and up to W data packets can be acknowledged per ACK packet.

You need to use structure so that you must have following entries in the packet you design. The data transfer will be bidirectional. So your packets should include:

1. A sequence number, ***s***
2. An acknowledge number, ***a***
3. Payload.

Then you must define a Window size, w and an RTT (per packet by using a timer) value and transmit windows worth data using multiple packets, where sequence number and acknowledgement number corresponds to the number of bits in the payload.

You should simulate the packet dropping by some means (use a very small RTT? Or any idea you feel to simulate this) so that you can demonstrate the selective acknowledgement properly.

The two way transfer **must** happen simultaneously. This would require mechanism like select or multithreading options.

We expect you to read the entire RDT discussion in the text book before implement this. This might help you in the modification/evaluation/exam(s).

Testing

You need to generate data packets. Your generation of packets should have a delay between them uniformly chosen from the interval [0...1] second. To test your program, you need to simulate:

* duplicated packets
* lost packets
* out-of-order packets