Computer Networks 2 (CS-3543)
Lab Assignment - 4
Date: 29/01/2019

Implement Stop and Wait Protocol

1. Implement Stop and Wait ARQ mechanism as an application layer protocol in C/C++. Use UDP as an underlying transport protocol for sending the application layer messages. (10 Points)
    - **a.** Create appropriate headers for your ARQ protocol such as checksum, Data/ACK, segment size, sequence number etc. You can design the header based on your protocol design and can append before the data. It is a good practice to keep your header fixed size and put into the packet in binary format.
    - **b.** Split the data received from the higher layer protocol into fixed size segments (except the last one) and add the appropriate header before sending.
    - **c.** Use timer (fixed time) to resend the packet if the ACK is not received within specific time.
    - **d.** Recommended to use the FSM discussed in the class for the implementation.
2. Implement a file transfer using the developed ARQ protocol in Step 1. (5 Points)
    - **a.** Get the file name from the user and transfer the file using the ARQ mechanism developed Step 1.
    - **b.** Create artificial delay and losses using tc command in linux to study the performance of the developed protocol in terms of time taken to transfer a fixed size file (of reasonable size).
    - **c.** Study the effect of few random delay values (varying the average delay below and above the timeout value) and loss rate (1% to 10% in steps of 2%) on the time taken to transfer the file.

★ Command to add a delay of 97ms on eth0 network interface;

```
# tc qdisc add dev eth0 root netem delay 97ms
```

To verify the command set the rule use;

```
# tc -s qdisc
```

To remove the delay on eth0 interface use;

```
# tc qdisc del dev eth0 root netem
```

To add a random loss on network Interface eth0 use;

```
# tc qdisc change dev eth0 root netem loss 0.1%
```