Programming Assignment 3

Implementation of a Reliable Application Layer Protocol

1. (50 Points) Design and implement an application layer protocol that implements a reliable transfer of file using following ARQ mechanisms.
    a. Stop and Wait - 20 Points
    b. Sliding window (Go-Back-N) - 30 Points

    Use UDP at the transport layer to create a unreliable communication path between source and destination.

    Stop and Wait Protocol (SWP)

    In case of SWP the server sends a fixed bytes (say 1000 bytes) as a payload in UDP datagram, and waits for client to send an ACK. ACK should be formatted and sent by client in a UDP datagram to the server. On receiving the ACK, server sends next 1000 bytes and so on. Maintain a SWP timeout timer, which times out after 3*RTT. Once timeout occurs server should resend the same packet. RTT should be estimated by the server. Incorporate the necessary information in the packet. You can design your own headers.

    Sliding Window Protocol (Go-Back-N) - GBN

    In case of GBN, the ACK should contain the sequence number of successfully received segments. If a segment is lost then ACK sent should contain the last successfully received sequence number, for which sender will transmit the remaining segments in the window. If timeout occurs the same procedure is followed as in case of packet loss.

2. (20 Points) **Performance evaluation**

    a. Vary the packet error rate using ethtool, from 10^{-6} to 10^{-1} and plot the time to download a fixed size file (say 10 MB). For both SWP and GBN-5, GBN-10, GBN-15, GBN-20. The number 5, 10, 15, 20 are the window size.
    b. Vary the packet delay from 1 msec to 100 msec (at step size of 10 msec), for a fixed packet loss rate of 10^{-2}, and plot the time to download a fixed size file (say 10 MB). For both SWP and GBN-5, GBN-10, GBN-15, GBN-20.
    c. Vary the fixed window size (in packets) of GBN from 10 to 50in steps of 5, and plot the time to download for a fixed packet loss rate of 10^{-2} and delay of 100 msec.
3. (5 Points) Assignment Report - Provide a complete report on the implementation, studies performed, and inferences made. The report should provide all the necessary information such that one can evaluate your assignment without your help.
4. (5 Points) Viva during evaluation.

Submission Guidelines: Provide the following in a single zip file named as

<your roll no>_<assignment3>.zip (failing to submit in this format will have 10% penalty)

1. All source codes and help file to run your code.
2. Assignment Report

Note 1: Plagiarism check will be done on your submitted code. Department plagiarism policy applies. Refer to http://cse.iith.ac.in/?q=node/254

Note 2: The evaluation will be done offline by the TAs on a designated time slot in the lab/classroom. If the assignment is not evaluated on the given time slot, the assignment would be treated as not submitted.