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BRIEF REPORT

1) What defines end-to-end delay?

Ans. End-to-end delay is the time taken for a packet to be transmitted across a network from source to destination. It is measured from several delays including transmission delay, propagation delay, processing delay and queuing delay. It differs from RTT(Round Trip Time) in that only path in the one direction from source to destination is measured.

So, in this assignment end-to-end delay will depend upon propagation delay on both sides and processing time taken by sender and receiver.

2) What defines throughput?

Ans. Throughput is the rate of successful message delivery over a communication channel. It is usually measured in bits/sec or bps.

Here, we can at max generate 400 packets/sec. Each packet size can be up to 2280. If there are no errors during propagation then this will correspond to maximum throughput.

3) What is meant by drop rate?

Ans. Drop rates are of two types that are Bit-error rate and Packet-drop rate. Packets are dropped because of congestion, no “ACK” from the receiver, bit corruption due to noise, distortion and attenuation.

4) How does system performance vary when

a) **Error-probability is 0.01, 0.05, 0.1**
   If we decrease Error-probability performance will increase as packets drop rate will decrease.

b) **Window size 5, 7 and 9**
   Increasing window size will decrease performance as probability of errors will increase in same window leading to more cases of going-back-n.

c) **Propagation delay is 0ms, 3ms and 5ms**
   Increasing propagation delay will decrease performance

Brief Explanation of Go-Back-n Implementation :

a) We have created two python files as **sender.py** and **receiver.py** which are represented as sender and receiver respectively.
b) For connecting these two data link entities (sender and receiver) we have used socket networking library.
c) Here, Sender is sending packets(header inclusive) to the receiver with a data-frame error probability of 0.1 and accepting ACKs and NACKs from the receiver. Whereas, Receiver is sending ACKs and NACKs with an ACK frame
d) error-probability of 0.05.
e) We have also introduced the variables(error-probability, window size and propagation delay) for sender and receiver so as to check system performance by varying them.
f) We have created a packet of string using chars from a to z and A to Z by random choosing with each packet size between 512 bits to 2024 bits. This packet is sent with some error-probability provided as a correct packet or incorrect packet from the sender.
g) Similarly, we have introduced an ack of string with 256 bits which is also sent with some error-probability provided as a correct packet or incorrect packet from the receiver.
h) We have used various socket library functions for establishing communication between sender and receiver as follows :

gethostname() = for getting the host name
bind() = to bind the host and port
listen() = listen for connections made
accept() = accepts a connection present at same port
recv() = receives data
send() = sends data
close() = closes the connection

HOW TO RUN:

1) Run “bash script.sh”
2) Output on both sides will be printed on terminal
3) Open sender_log.txt and reciever_log.txt to access logs.

Implementation of Switch:

We have code for sender and receiver. A switch basically consists of 1 sender and k receivers. So if you do the same with these files you can get a switch configuration.