Go Back N Protocol Report

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Questions

- What defines end-to-end delay?
  - End to end delay is the time taken for a packet to reach the destination from the source.
  - This can be affected by the propagation delay and queuing delay.
- What defines throughput?
  - Throughput is the maximum rate at which messages can be successfuly delivered from a source to destination in a computer network.
  - It is defined by the bandwidth and the round trip delay , usually combined into delay bandwidth product.
- What is meant by drop rate?
  - Drop rate is the rate at which packets sent from a source to destination get corrupted and are received with an error.

Testing

For testing throughput, we have checked the time taken for 50k bytes to reach the other client.

For drop rate we checked the number of packets actually sent and the number of packets received at the other end before a certain packet number was reached.

For end to end delay we checked the time taken by one packet to reach the other client.

Performance (Throughput / Time for 50k data bytes)

- Error Probability (Delay 2ms, Window Size 7):-
  - 0.01 - 3.5 sec
  - 0.05 - 6 sec
  - 0.1 - 20 sec
- Window Size (Error 0.1, Delay 2ms):-
  - 3 - 20 sec
  - 5 - 6 sec
  - 7 - 20 sec
- Propagation Delay (Error 0.1, Window Size 7):-
  - 0ms - 15 sec
  - 3ms - 17 sec
  - 5ms - 18 sec

Performance (Drop rate)

- Error Probability (Delay 3ms, Window Size 7) - As errors increase, more packets are sent to successfully transfer data. So drop rate (ratio of packets sent to packets received) increases.:-
  - 0.01 - 0.34
  - 0.05 - 0.45
  - 0.1 - 0.53
- Window Size (Error 0.1, Delay 3ms) - When window size is lowered, less packets are sent uselessly when packet in middle gets dropped. For every error rate there is an optimum window size as can be seen in the result. :-
  - 3 - 0.45
  - 5 - 0.35
  - 7 - 0.53

Performance (End to end delay)

- Error Probability (Propagation Delay 3ms, Window Size 7) - -Delay turns out to be unaffected by error probability due to fast processing of buffers):- Approx. 3 ms for all cases which is almost equal to the propagation delay.
- Window Size (Error 0.1,Propagation Delay 3ms) -Delay turns out to be unaffected by window size due to fast processing of buffers):- Approx. 3 ms for all cases which is almost equal to the propagation delay.

Brief explanation (Part 1)

In this assignment we have implemented the Go-Back-N protocol using python and mininet. We have used sockets library of python.

We have constructed two hosts using mininet. Each of the hosts are connected to switches which are in turn connected to each other.Each of the hosts are running the same code of the Go-Back-N protocol (which can be found in the client.py file). The properties of the switches like Loss, Propagation Delay, Bandwidth can be changed. We have experimented with different values of these parameters to see how the protocol shows different perfromance for the same.

We have separated the different layers of the network into seperate threads which do their tasks concurrently (using Threads library of python). There is one other thread for the timer.

Brief explanation (Part 2)

Network Layer Thread :- This thread adds data packets of random length to the queue of waiting packets to be sent at the rate of 400 packets/second.

Physical Layer Thread :- This thread is responsible for receiving packets and sending them to the data link layer.

Data Link Layer Thread :- This thread manages the window, retrieval of data from network layer queue, sending packets to physical layer and resending of data on timeout.

Timer Thread :- This thread checks the last data packet sent time and asserts timeout boolean variable to true if the time difference between current time and last sent time exceeds 0.5 seconds.

Thank You