CS224 (m): Computer Networks (minor)
Tutorial 05, 26 Aug 2016

Concepts tested: sliding window, TCP overview

1. Consider operation of sliding window protocol over a link with data rate of 720Kbps and one way latency of 20ms and packet size of 120 bytes. What is the ideal SWS in terms of number of packets?

2. In the above setting, suppose SWS is set to its ideal value. If RWS was set to 1, what would the minimum number of bits needed to represent the sequence number?

3. Is the alternating bit protocol the same as Go-Back-N protocol with a sender and receiver window size of 1?

4. A pair of communicating entities use a sliding window protocol for reliable data transfer. If packet delay can be arbitrary, prove that no finite sequence number space is sufficient to guarantee reliable delivery (reliable implies each packet is delivered exactly once to the layer above).

5. Assuming no packet reordering between a pair of communicating entities, using a sliding window protocol, derive a general rule for the minimum sequence number space in terms of SWS and RWS. *Note: it can take a while to get the right argument.*

6. Draw a timeline of the sliding window protocol that employs selective acknowledgment with SWS=RWS=4. Assume frames 4,5 are lost. Use a time-out of 2*RTT. Show the timeline till frame 11 is sent.

7. Observe the TCP connection establishment prior to a HTTP request-response, using wireshark. Observe the SYN and ACK flags. Then observe the use of random initial sequence numbers. Observe the cumulative nature of the ACKs.

8. Using telnet to a web server (say www.cse.iitb.ac.in), and wireshark, show that the source ports are different for two different TCP connections, between the same two machines, and to the same destination port.