Practice Problems, CSL 858

Due date: None
Topics: Congestion Control

1. A satellite link exhibits a probability of bit-error 10^{-4} and has round-trip time 100ms. Assume that a packet transmission across this link is successful only if there are no bit errors in the packet. Compute the throughput of a TCP connection over this link using a standard TCP-rate formula, assuming a packet size of 100bytes and a transmission rate of 10^5bps. By how much does the throughput change if the packet size is doubled?

2. Design an end-to-end congestion control protocol "TCP-gentle" which (to a large extent) has the following properties.

   - TCP-Reno does not "lose" bandwidth to TCP-gentle. That is, TCP-Reno flows when competing with TCP-gentle flows see little difference in their own throughput when compared to the case in which the TCP-gentle flows are absent (all other factors being the same).
   - If all flows in a network run TCP-gentle then these flows grab all (or most) of the unused bandwidth of the network.

3. A lone TCP-Reno flow from "A" to "C" runs over a link with propagation delay 10ms and maximum transmission rate 10Mbps (see Figure 1). A malicious person wants to ensure that the TCP-Reno flow gets very little bandwidth. He has access to nodes "B" and "D". One way to do this is to continuously flood the link with data at a rate close to 10Mbps so that the router queue at R1 overflows and all the TCP-Reno packets are dropped. The malicious person wants to, however, use very little bandwidth so that it is harder to detect his presence. How might he accomplish his goals?

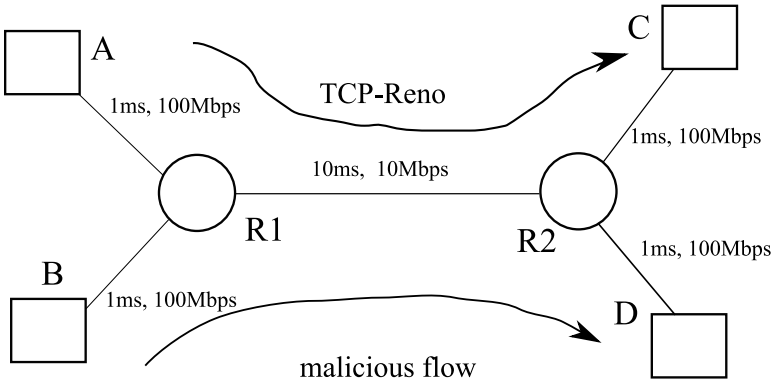

Figure 1: TCP-Reno and Malicious Flow