Computer Networks Group

University of Göttingen, Germany

Homework 8

(Due on 12:00am, Thursday, Dec. 17th, 2009)

1. A) Please calculate the utilization rate of the sender U_{sender} for the stop and wait protocol scenario:

Packet size (L): 2 000 bits (including header) Transmission rate (R): 2 Mbit/s Round Trip Time (RTT): 200 ms

B) How big would the window size need to be for channel utilization U_{sender} to be greater than 95%?

- Selective Repeat Dilemma. A limited sequence range leads to the dilemma of the receiver not being able to distinguish whether a new packet is received or an old (lost/corrupt) packet is retransmitted. What is the cause for this dilemma, discuss the solution.
- TCP Congestion Control. Suppose that in TCP, the sender window is of segment size N = 200, the base of the window is at sequence number 600, and the sender has just sent a complete window size of segments. Let RTT be the sender-to-receiver-to-sender round trip time of 200 ms and Maximum Segment Size MSS = 1 000 bytes.

a) Assuming no loss, what is the throughput (in terms of MSS and RTT) of this message exchange?

b) Suppose TCP is in its congestion avoidance phase. Assuming no loss, what is the window size (in terms of segment) after the N = 200 segments are acknowledged?



Source: Computer Networks, Kurose, Chapter 3, Figure 3.52, Fifth Edition

- 4. Please consider the following figure 3.58, TCP Reno is used with fast recovery mode.
 - a. In what interval of time does slow start mode operate?
 - b. Identify the intervals of time when TCP congestion avoidance is operating.
 - c. After the 16th transmission round, is segment loss detected by a triple duplicate ACK or by a time out?
 - d. After the 22nd transmission round, is segment loss detected by a triple duplicate ACK or by a time out?



Source: Computer Networks, Kurose, Chapter 3, Figure 3.58, Fifth Edition

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WS2009/2010