HOME WORK ASSIGNMENT#5

Due Date April 25, 2008 (10x100=1000 points)
CS 4/55201 COMPUTER NETWORKS
Spring 2008, Department of Computer Science, Kent State University

1. (Chapter 6, Problem 4) Suppose that the clock-driven scheme for generating initial sequence numbers is used with a 15-bit wide clock counter. The clock ticks once every 100 msec, and the maximum packet lifetime is 60 sec. How often need resynchronization take place
   (a) in the worst case?
   (b) when the data consumes 240 sequence numbers/min?

2. (Chapter 6, Problem 6) Imagine that a two-way handshake rather than a three-way handshake were used to set up connections. In other words, the third message was not required. Are deadlocks now possible? Give an example or show that none exist.

3. (Chapter 6, Problem 13) Discuss the advantages and disadvantages of credits versus sliding window protocols.

4. (Chapter 6, Problem 16) A client sends a 128-byte request to a server located 100 km away over a 1-gigabit optical fiber. What is the efficiency of the line during the remote procedure call?

5. (Chapter 6, Problem 25) The maximum payload of a TCP segment is 65,495 bytes. Why was such a strange number chosen?

6. (Chapter 6, Problem 30) If the TCP round-trip time, RTT, is currently 30 msec and the following acknowledgements come in after 26, 32, and 24 msec, respectively, what is the new RTT estimate using the Jacobson algorithm? Use $\alpha = 0.9$.

7. (Chapter 6, Problem 33) In a network that has a maximum TPDU size of 128 bytes, a maximum TPDU lifetime of 30 sec, and an 8-bit sequence number, what is the maximum data rate per connection?

8. (Chapter 6, Problem 34) Suppose that you are measuring the time to receive a TPDU. When an interrupt occurs, you read out the system clock in milliseconds. When the TPDU is fully processed, you read out the clock again. You measure 0 msec 270,000 times and 1 msec 730,000 times. How long does it take to receive a TPDU?

9. (Chapter 6, Problem 36) To get around the problem of sequence numbers wrapping around while old packets still exist, one could use 64-bit sequence numbers. However, theoretically, an optical fiber can run at 75 Tbps. What maximum packet lifetime is required to make sure that future 75 Tbps networks do not have wraparound problems even with 64-bit sequence numbers? Assume that each byte has its own sequence number, as TCP does.

10. (Chapter 6, Problem 42) What is the bandwidth-delay product for a 50-Mbps channel on a geostationary satellite? If the packets are all 1500 bytes (including overhead), how big should the window be in packets?

All problems are from Computer Networks, Andrew S Tanenbaum, Fourth Edition. If there is any inconsistency please email TA (ydrabu@cs.kent.edu)