Electrical, Computer, and Systems Engineering
ECSE 4760: Computer Communication Networks

Homework set 2: Due Tuesday, September 25 (Wednesday, October 3 for tape delayed students)

Notes:

1. Be brief.
2. **SUBMIT THIS HOMEWORK USING WEBCT DROP BOX.**
3. 4000 level students need to answer only Reading Assignment questions 1 and 2 and Homework Problems 1, 2 and 3.
4. 6000 level students need to answer all questions.
5. All papers for the reading assignment are available from the course web page.

Reading Assignment

1. Read RFC 1034 for DNS. Summarize concepts not covered in class. The RFC is available at http://www.landfield.com/rfcs/rfc1034.html (15 pts)

Homework Problems

1. Unix (or any one its flavors) supports the "nslookup" command. Use the command nslookup in two modes: nondebug and debug mode and lookup some well known web sites (like www.yahoo.com), university sites (www.lcs.mit.edu) and international sites (www.bbc.co.uk, www.iitk.ernet.in). For example "nslookup www.yahoo.com" and "nslookup -debug www.yahoo.com." Explain why some of the name lookups return multiple addresses in the nondebug mode. Based upon the output you get using the debug option, explain the key fields in the HEADER, QUESTIONS, ANSWERS, AUTHORITY and ADDITIONAL RECORDS. (25 pts)

2. Concepts: **(Caching/Content Distribution)**

Suppose we want a mechanism by which clients access whichever of multiple HTTP servers is closest to it, where distances are calculated according any suitable unit.

(a) How would you develop a mechanism based upon HTTP for doing this.

(b) How would you develop a mechanism based upon DNS for doing this.

Discuss the relative merits of both approaches. (25 pts)

3. A 5.6 Mbps satellite channel with 270 msec. propagation delay (Node A to Node B) is used to send data from point A to point B. Data packets are 5600 bits long while ACK and NACK packets are only 112 bits long. Each frame will be ACKed or NAKed by Node B.

(a) Assume a Go-Back-N ARQ protocol and no errors and no lost frames and the window size (N) is 4. How much time is required to transfer exactly 128 frames and receive all 128 ACKs?

(b) Now consider the case when the very first packet is received with a bad checksum (the only error to occur). How many packets are retransmitted and when? What is the total time it takes to transfer all 128 packets and receive their ACKs? (35 pts)

Additional questions for 600 level students

1. Design a reliable, go-back-N data transfer protocol that uses **only** negative acknowledgments (NAKs). Explain what we gain or lose by using NAKs instead of Selective ACKs and cumulative ACKs. Why do we in general prefer cumulative ACKs for go-back-N rather than selective ACKs ? (30 pts)

2. Reading: V. G. Cerf and R. E. Kahn "A Protocol for Packet Network Intercommunication," *IEEE Transactions on Communications,* vol. 22, no. 5, pp. 637-648, May 1974. (Available from http://www.ecse.rpi.edu/Homepages/shivkuma/teaching /sp2001/readings/cerfkahn.pdf) Submit a one page summary of the paper. (20 pts)