CS 276 – Distributed Computing and Computer Networks
Midterm Exam
Open Books, Papers and Notes

Question 1: Network Protocols Basics

(4 pts)(A) What is the Pseudo Header, what is it used for, and how is it computed?

(4 pts)(B) Why is it important to have accurate timers in TCP? Explain what happens when the timers are too short and what happens when they are too long.

Question 2: CIDR

I run an ISP that has been around for a while. When I originally requested IP addresses, IANA gave me three Class B address ranges: 130.7, 130.8, and 130.9.

(4 pts)(A) In today's CIDRized system, what prefixes do I advertise to the world (assume I run a stub network)?

(4 pts)(B) If IANA wanted to reorganize and do a better job of optimizing what I advertise, what address ranges might I be re-assigned and THEN what prefixes would I advertise? (Don't short change me on the number of host addresses I can have!)

Question 3: HTTP Basics

(2 pts)(A) Does HTTP 1.0 allow parallel connections?

(2 pts)(B) Does HTTP 1.0 allow persistence?

(2 pts)(C) What are the default settings for HTTP 1.1 with regard to (non-)persistence and (no) pipelining?

(4 pts)(D) What convenience do cookies offer and how do they work?

Question 4: Old Fashioned TCP/IP

(15 pts) We have discussed the limitations of both IP and TCP as networks get faster and (in some cases) have long one-way propagation delays. List the protocol deficiencies for both IP and TCP and describe either the deployed solution or the proposed solution. HINT: use the various header fields in TCP and IP as a guide.

Question 5: TCP Congestion Control

We have discussed a number of different kinds of TCP congestion control algorithms (some used in "standard" networks and some used in wireless environments). Part of the challenge of making TCP work well, is designing the congestion control and error recovery algorithms to work well in a variety of network environments. Some environments have low/high loss, bursty/constant sources, low/high probability of reordering, low/high probability of congestion, short/long connections, etc.

(15 pts)(A) In terms of the parameters that affect TCP the most, describe your perception of the state of the traditional, terrestrial Internet (ISPs, backbones, etc., but no wireless or satellite links). This question requires two steps: (1) identify the parameters important to the performance of TCP, and (2) characterize this set of parameters for today's Internet.

Question 5: TCP Congestion Control (cont)

(15 pts)(B) Now consider the following network environment: a single hop wireless network that has reasonably high loss (5% to 10% packet loss), but a significant percentage of the loss is due to the medium. We also know that the applications run over this network will be for transaction-oriented processes, i.e. very short connection durations where only a few packets are transfered in each direction for each connection. What "kind" of TCP should be used? HINT: choose from among the protocols discussed in the wireless TCP paper, but also consider the effect of "short connections". Justify your answer.

Question 6: Studies of Routing

(2 pts)(A) Consider a BGP network that has two paths: A-B-C-D, and A-E-F-D (similar in structure to the Figure on Pg 197 of the Huitema BGP text). A is trying to get traffic from itself to D. Consider the following two situations:

(1) C does not want to provide transit for A's traffic.

(2) A does not want its traffic to go through C.

Which situation can be more easily implemented in BGP, (1) or (2)?

(2 pts)(B) How did Paxon characterize the behavior of the Internet's routers: did he find that there was a well-defined set of routing behaviors or did he find that many behaviors existed?

Question 6: Studies of Routing (cont)

(15 pts)(C) We read three papers on routing instability. Make a chart with two columns. In the first column, describe the type of data collected. In the second, describe how the data was used and the focus of the analysis.

Question 6: Studies of Routing (cont)

(10 pts)(C) Now describe the similarities and differences between the three studies paying particular attention to any overlaps in results, analysis, and conclusions.