Sample Midterm

ELEN E6761 - Computer Communication Networks
Fall 2000 Prof. Rubenstein

Answer all questions as best you can. Partial credit will be given for problems, so if you cannot solve the problem, you have two choices. You may complete as much of the problem as you can, or you can solve a modified problem by first stating the modification and then solving the modified problem instead. The credit that you get is a function of how much the problem was changed and/or simplified, and how complete the solution is. The equation churning that you need to do for the problem as originally stated should be minimal.

1. (10 pts) Name the 5 layers within the Internet protocol stack, starting from the top (closest to a user), and give some example services provided at that layer.

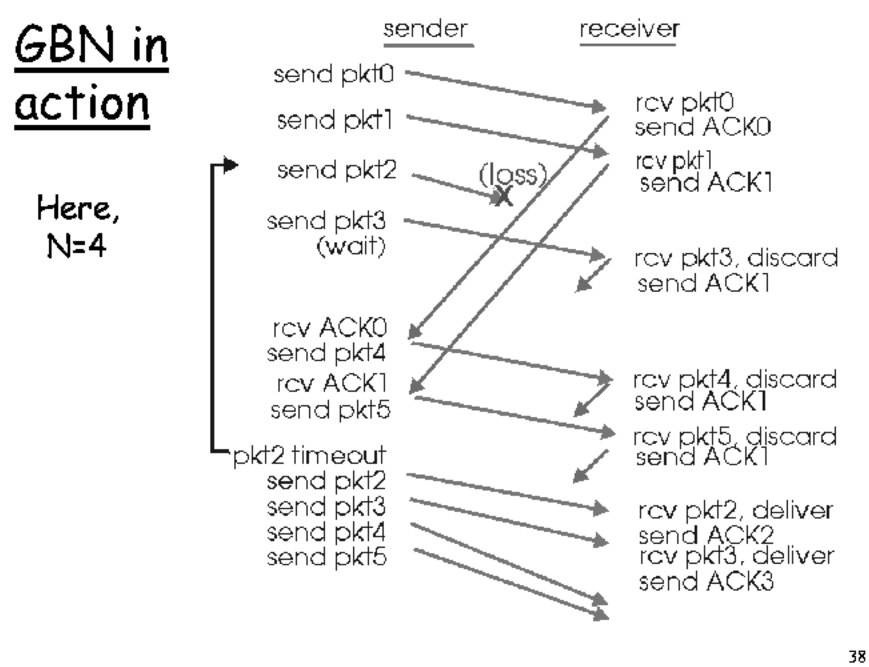
2. (5 pts) What is the purpose of the `bind()` system call?

3. (10 pts)

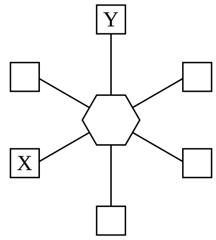
   (a) (5 pts) How and when does a host obtain the MAC address for the destination end-system?

   (b) (5 pts) What does it do otherwise?

4. (15 pts) The figure below is meant to depict the Go-Back-N protocol in action, but event is missing. What is it?



5. (20 pts) Consider a set of $n+1$ end-systems connected together in the topology shown below (in the picture, $n = 5$:



In the center of the topology, one can either place a hub or a bridge to connect the various end-systems together. Assume that communication is done in a round-by-round fashion. Each end-system has a set of messages it wishes to send, and transmits its message in round i with probability p. Consider the host labeled X that sends its messages to the host labeled Y.

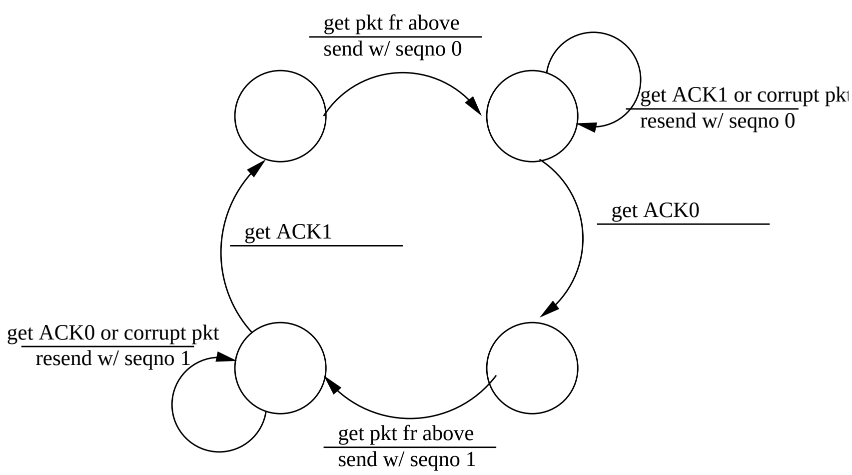
(a) (5 pts) If a hub is placed in the middle, what is the expected number of successful transmissions that X makes to Y in a round?

(b) (5 pts) With a hub in the middle, what should p be set to to maximize the rate of communication?

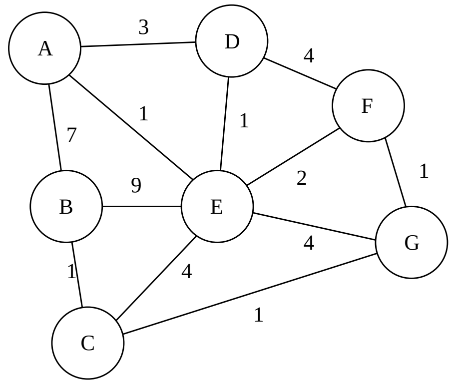
(c) (5 pts) If a bridge is placed in the middle, what is the expected number of successful transmissions that X makes to Y in a round?

(d) (5 pts) With a bridge in the middle, what should p be set to to maximize the rate of communication?

6. (20 pts) The figure below gives the finite-state machine for the sender process in a reliable communication protocol. Given that packets in the network layer can be dropped or lost (but not reordered), the finite-state machine for the receiver side.



7. (20 pts) Assume that the network below has just been "turned on". Fill in the table as would a Link State routing algorithm.



step	added-node	$D(B), p(B)$	$D(C), p(C)$	$D(D), p(D)$	$D(E), p(E)$	$D(F), p(F)$	$D(G), p(G)$
0							
1							
2							
3							
4							
5							
6							