KFUPM - COMPUTER ENGINEERING DEPARTMENT

COE-540 – Computer Networks

Assignment # 4 – Due May 14th, 2012 (in class)– Makeup assignment

Student Name:
Student Number:

Problem #	Maximum Mark	Mark
1	5	
2	5	
3	20	
4	10	
5	10	
6	10	
Total	60	

Problem 1 (5 points): Hamming codes have a distance of three and can be used to correct a single error or detect a double error. Can they be used to do both at the same time? Explain why or why not? What minimum distance is needed to correct single bit errors and detect double bit errors?

Problem 2 (5 points): Consider the contention process for carrier sense multiple access (CSMA) with collision detection. If two stations start transmission at time t_0, what is the maximum period of time after which the two stations have realized that they have collided. Assume the end-to-end propagation time for the LAN segment is equal to τ seconds. Explain your answer.

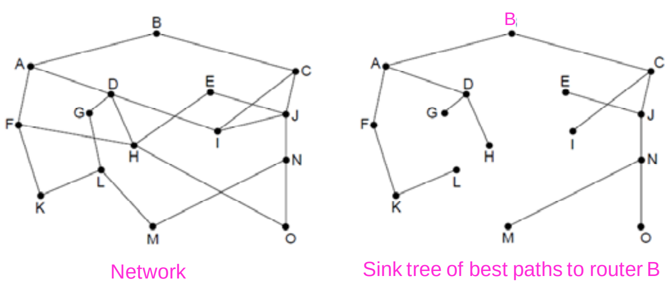
Problem 3 (20 points): Assume $N > 1$ terminals are competing for medium access. Each terminal has a probability equal to p to transmit during a slot and a probability of $1 - p$ to defer transmission. The probability that some terminal successfully accessing the medium during a given slot is the probability that any one transmits and all other $N - 1$ terminals defer.

a) Write an expression for the probability of success for a transmission in a given time slot.

b) If p is a controlled parameter, it is desired to optimize the probability of success for a given number of terminals N. What value of p should be used? What would be the probability of success then?

c) Plot the optimal probability of success versus the number of terminals N. What is the optimal probability of success when the number of terminals approaches infinity (similar to the slotted ALOHA case!)

Problem 4 (10 points): Consider the network shown in figure below. How many packets are generated by a broadcast from node B using (a) reverse path forwarding, (b) the sink tree.



Problem 5 (10 points): Assume a flow specification has a maximum packet size of 1000 bytes, a token bucket rate of 10 million bytes/sec, a token bucket size of 1 million bytes, and a maximum transmission rate of 50 million bytes/sec. How long can a bust at maximum speed last?

Problem 6 (10 points): The set of IP addresses from 29.18.0.0 to 19.18.128.255 has been aggregated to 29.18.0.0/17. However, there is a gap of 1024 unassigned addresses from 29.18.60.0 to 29.18.63.255 that are now suddenly assigned to a host using a different outgoing line. Is it now necessary to split up the aggregate address into its constituent blocks, add the new block to the table, and then see if any aggregation is possible? If not, what be done instead?