Ph.D. Qualifying Exam: Computer Networks
Department of Computer Science and Engineering
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(1) In CSMA/CD, after the sixth collision, what is the probability that a node chooses K=5? The result K=5 corresponds to a delay of how many seconds on a 10Mbps Ethernet. (10%)

(2) Please explain why CSMA/CA is used to replace CSMA/CD in wireless networks. (5%)

(3) Please explain the steps of handoffs in GSM when a base station decides to hand off a mobile user. (10%)

(4) Please describe the basic ideas of firewalls and intrusion detection system (IDS) and explain the main differences between these two systems. (10%)

(5) Please give a brief introduction to each layer of TCP/IP and OSI networking models and a comparison of these two models. (10%)

(6) Given the IP address and netmask 200.123.123.130/27, please show (1) the binary subnet mask, (2) the IP class, (3) the number of possible subnets and the network addresses and usable host ranges of these subnets. (15%)

(7) Please describe slow start, congestion avoidance, and fast recovery. (10%)

(8) TCP and UDP are the two critical Internet protocols. Please describe these two protocols and compare them to show their pros and cons. (10%)

(9) Please explain the main purposes of protocols NAT, DHCP, ARP, ICMP, and IGMP. (10%)

(10) Suppose the information content of a packet is the bit pattern 1010 0111 1011 1001 and an even parity scheme is being used. What would the value of the field containing the parity bits be for the case of a two-dimensional parity scheme. Your answer should be such that a minimum-length checksum field is used. (10%)