

P1. Suppose the information content of a packet is the bit pattern 1110 0110 1001 1101 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.

P2. Consider two nodes, A and B, that use the slotted ALOHA protocol to contend for a channel. Suppose node A has more data to transmit than node B, and node A's retransmission probability p_A is greater than node B's retransmission probability, p_B .

a) Provide a formula for node A's average throughput.

- A) $p_A p_B$
- B) $p_A (1 - p_B)$
- C) $p_B (1 - p_A)$
- D) $p_A - p_B$

What is the total efficiency of the protocol with these two nodes?

b) If $p_A = 2p_B$, is node A's average throughput twice as large as that of node B? Why or why not?

- A) No
- B) Yes

If not, how can you choose p_A and p_B to make that happen?

c) In general, suppose there are N nodes, among which node A has retransmission probability $2p$ and all other nodes have retransmission probability p .

i) What is the average throughputs of node A?

- A) $p(1-p)^{N-1}$
- B) $2p(1-p)^{N-1}$
- C) $2p(1-2p)^{N-1}$
- D) $2p$

ii) What is the average throughputs of any other node?

- A) $p(1-p)^{N-2}(1-2p)$
- B) $p(1-p)^{N-1}(1-2p)$
- C) $2p(1-p)^{N-2}(1-2p)$
- D) $p(1-p)^{N-1}$

P3. Why does collision occur in CSMA, if all nodes perform carrier sensing before transmission?

P4. Consider the self-learning with multi-switch as shown in the figure below. Suppose A sends frame to G, and then G responds to A. Show the switch tables and packet forwarding in S_1 , S_2 , S_3 , S_4 .

