Report for MP4

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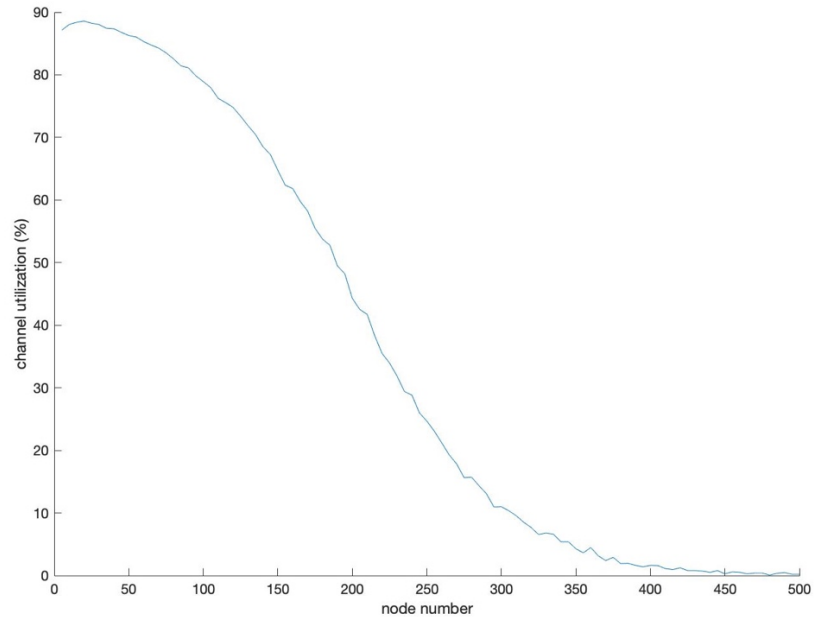
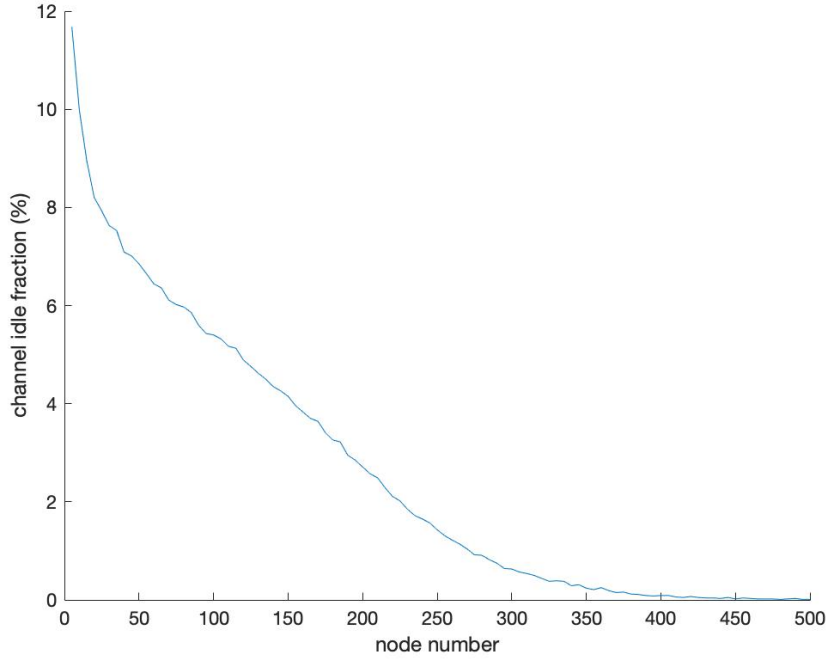
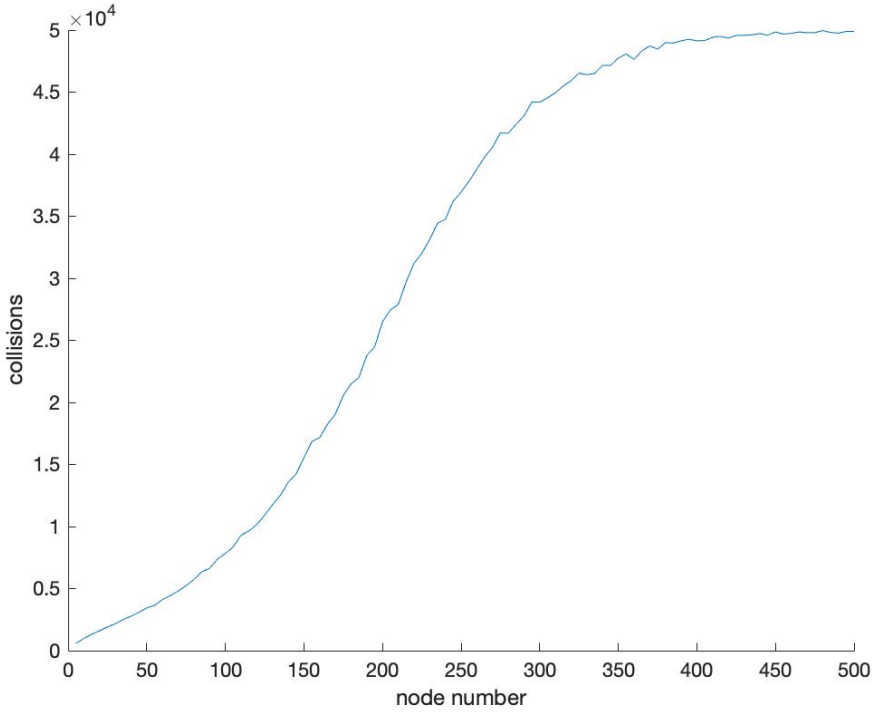
(a) Plot how channel utilization (in percentage) varies with increasing number of nodes (i.e., N varying from 5 to 500). Channel utilization is defined as the ratio of clock ticks that were used up for correct communication to the total number of clock ticks, T.



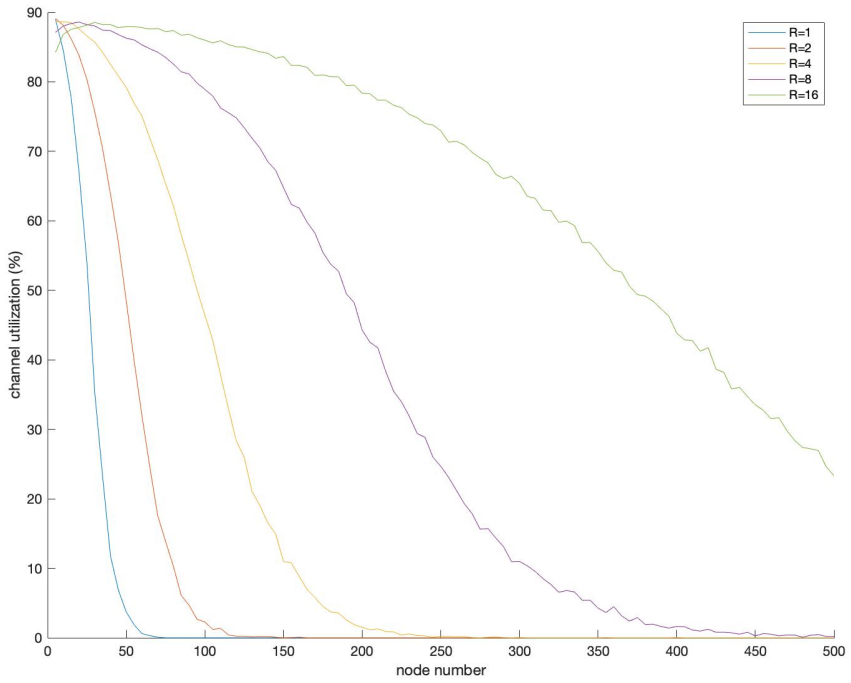
(b) Plot how the channel idle fraction (in percentage) varies with increasing number of nodes (i.e., N varying from 5 to 500). Channel idle fraction is defined as the ratio of unused clock ticks to the total number of clock ticks, T. Note that unused clock ticks do not include collisions.



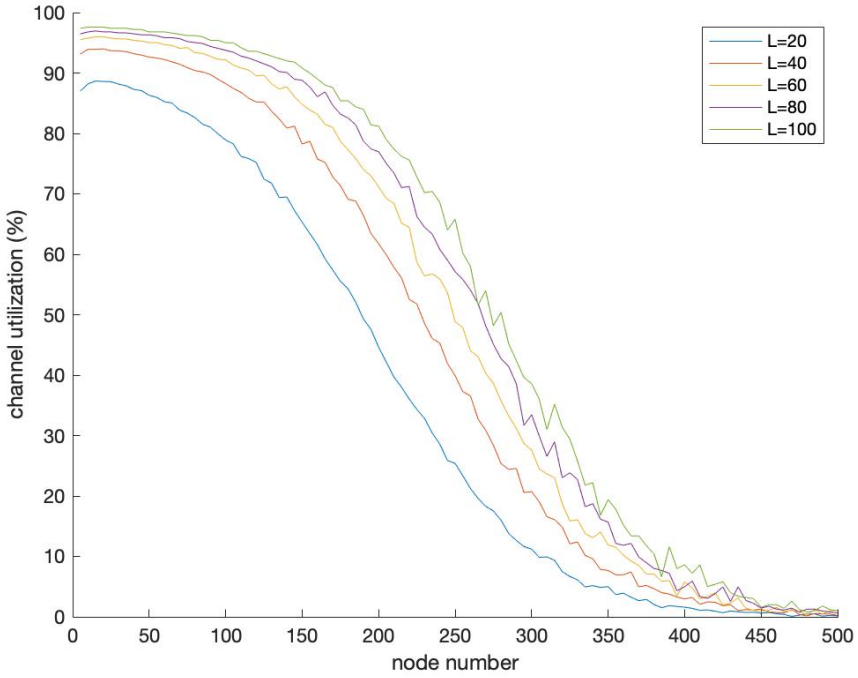
(c) Plot the total number of collisions with increasing number of nodes (i.e., N varying from 5 to 500).



(d) Repeat part (a) but plot 5 curves on the same graph, each curve corresponding to different initial values of R: 1, 2, 4, 8, 16. For each of the 5 cases, let R double upon collisions.



(e) Repeat part (a) but plot 5 curves on the same graph, each curve corresponding to different packet lengths L: 20, 40, 60, 80, 100.



(f) Explain the shape of the curves in (d) and (e) by elaborating on how/why increasing value of N, R, and L impact channel utilization.

Increasing value of N: If N increases, probability of collision will increase as well, making channel utilization drop.

Increasing value of R: If R increases, with less probability of choosing similar back off time, system will have better chance (higher probability) to avoid collision, thus channel utilization will be higher when R increases.

Increasing value of L: If L increases, initially there will be more time spend on transmitting than counting down, making performance better; however, when N is large, performance is bad as well.