# Maximizing Aggregate Throughput of Wireless Ad Hoc Networks Using Enhanced Physical Carrier Sensing

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## Abstract

Aggregate throughput of wireless ad hoc networks is diminished by the presence of hidden terminal problem which can cause packet collisions at the receiver and exposed terminal problem which can degrade spatial reuse of the network. As reducing one problem increases the other, the aggregate throughput will be improved only if tradeoff between these two problems is achieved. In this paper, we propose a medium access control scheme which utilizes enhanced physical carrier sensing with tunable carrier sense range based on transmitter-receiver distance. Two analytical formulations for deriving optimal carrier sense ranges: one for interference mitigation and the other for reducing exposed terminal problem have been proposed and the optimal carrier sense range for balancing these two problems has also been estimated based on these formulations. Effectiveness of enhanced physical carrier sensing with tunable carrier sense range on achieving the highest aggregate network throughput has been demonstrated and the optimal carrier sense ranges for different transmitter-receiver distances have been investigated through extensive simulations. Comparisons between simulation results and theoretical results have been presented to validate our proposed scheme.