

Jordan University of Science and Technology

N-BEB: New Backoff Algorithm for IEEE 802.11 MAC Protocol

Authors: Mohammad Shurman, Bilal Al-Shua'b, Mohammad Alsaedeem, Mamoun F. Al-Mistarihi, and Khalid A. Darabkh

Abstract: IEEE 802.11 standard uses Distributed Coordination Function (DCF) which uses carrier sense multiple access with collision avoidance (CSMA/CA), when a collision occurs a backoff algorithm will take place. The default backoff mechanism used in 802.11 is the binary exponential backoff (BEB) algorithm to randomize medium access for the nodes. In this paper, we analyze the behavior of a few backoff algorithms used in IEEE 802.11 standard: BEB, I-BEB, and E-BEB, then we propose the New Binary Exponential Backoff (N-BEB) algorithm to improve channel access fairness while preserving the channel throughput. E-BEB achieves lower fairness but with higher complexity, which increase power dissipation, I-BEB achieves higher fairness with highest number of dropped packets among all approaches which leads to channel overhead increase and network utilization reduction. Our N-BEB algorithm improves the selection process of the contention window CW based on the number of successful and unsuccessful transmissions. Simulation results confirm fairness improvement, fairness enhancement, reduction of dropped packets and high delivery ratio for proposed protocol.