

Jordan University of Science and Technology

Modulation Silencing: Design and Application in RFID Anti-Collision Protocols

Authors: A. Alma'aitah, H. S. Hassanein and M. Ibnkahla

Abstract: Reliable and energy-efficient reading of Radio Frequency Identification (RFID) tags is of utmost importance, especially in mobile and dense tag settings. We identify tag collisions as a main source of inefficiency in terms of wasting both medium access control (MAC) frame slots and reader's energy. We propose modulation silencing (MS), a reader-tag interaction framework to limit the effect of tag collisions. Utilizing relatively simple circuitry at the tag, MS enhances the performance of existing anti-collision protocols by allowing readers to terminate collision slots once a decoding violation is detected. With shorter collision slots, we revisit the performance metrics and introduce a new generalized time efficiency metric and an optimal frame selection formula that takes into consideration the MS effects. Through analytical solutions and extensive simulations, we show that the use of MS results in significant performance gains under various scenarios.