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Abstract

We examine two approximative models for the behavior of an IEEE 802.11 WLAN under Poisson MAC-level arrivals. Both models extend, in a simple manner, the analysis for saturated stations with the decoupling approximation. The first follows a well-known approach considering a constant busy station probability at each idle-sensed slot, equal to the load of the envisaged single-server queue. We extend the analysis of this model to calculate more accurately the throughput seen by a station in non-saturation conditions, by considering alternating ON/OFF periods. The second model uses this ON/OFF process structure for calculating attempt and collision probabilities, and subsequently performance measures, based on regenerative process theory. By comparison with simulation results, this model is shown to be more precise for low load conditions. The accuracy of the modeling approximations is also studied for a range of values of the minimum contention window, which is the most influential protocol parameter.
Keywords WLAN - 802.11 - mathematical modeling - non-saturation

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