

Experimental Evaluation of the Coexistence of IEEE 802.11 EDCA and DCF Mechanisms

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Abstract— The IEEE 802.11 standard is the most widely-used wireless technology in the industry. In the last few years, this standard has been subject to multiple revisions to improve the supported Quality of Service (QoS). Among such QoS improvements, we highlight the EDCA and HCCA MAC layer mechanisms, which both work on the top of the DCF (Distributed Coordination Function) mechanism. Currently, DCF is the only commercially-available option in the vast majority of the IEEE 802.11 adapters. Therefore, stations using communication adapters based on any new mechanism must be able to provide QoS guarantees in the presence of stations using state-of-the-art DCF adapters. In this paper, we perform an experimental assessment of the coexistence of EDCA and DCF mechanism in a real-time (RT) communication scenario. More specifically, we assess the ability of the EDCA mechanism to handle RT traffic in overlapping basic service set (OBSS) scenarios, where RT stations share the same frequency channel and coverage area with alien DCF stations. The main purpose of this paper is to understand the limitations of the EDCA mechanism when supporting RT traffic in open communication scenarios. We show that when the environment is shared with non-RT alien devices operating under the traditional DCF mechanism, the EDCA mechanism is not able to adequately support RT traffic.

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