# Evolution of CSMA Protocols of the IEEE 802.11 Standard

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***Abstract*—In this paper we present the requirements of candidate protocols to replace the pervasive CSMA/CA medium access control. We discuss the possibility of further preventing collisions and provide an overview of the related work. We specify protocols that are candidates of replacing CSMA/CA in pseudocode and use simulation to assess performance metrics such as throughput, fairness and collision probability.**

## I. Introduction

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A candidate to replace CSMA/CA should

- Provide performance advantages, either in the form of throughput or short term fairness.
- Be backward compatible with current implementation.
- Be simple a simple evolution implementation to ease the transition and reduce time to market (Optional but desirable).

## II. Related Work

Since the popularization of IEEE 802.11, several papers have proposed modifications to the contention protocol that is used for sharing the medium. They can be categorized in three groups regarding the approach they use. The first one prevents that the contention window is reset to its minimum value after successful transmissions. Examples of this first group include [1], [2]. This solution improves throughput in saturation conditions at the price of lowering short term fairness.

The second groups involves the accurate estimation of the number of contenders to adjust the contention parameters. Two examples of this group are [3], [4]. This approach offers some throughput and fairness gains at the expense of increased implementation complexity. As the number of contenders is estimated relying on the number of collisions, the presence of channel errors further complicates the estimation. Furthermore, there is a fundamental trade-off between the accuracy and reaction time of the estimation.

The aforementioned solutions are not able to fairly share the medium with legacy devices.In fact, these proposals are, generally speaking, less aggressive than the currently implemented protocol. Consequently, in a shared network, the new stations would receive a smaller share of the available bandwidth in a mixed scenario.

A more important limitation of the solutions exposed so far is that the throughput is bounded by that of CSMA/CA with optimal configuration [3], [5]. In this paper we focus on a third group of solutions that delivers throughput above the maximum attainable by CSMA/CA.

This third group of solutions uses a deterministic backoff after successful transmissions to further reduce the chances of collisions. It was introduced in [6] and a more detailed analysis that includes both saturated and non-saturated conditions is presented in [7]. analyzed in depth in [8].

## III. Enhanced CSMA

## IV. Performance Evaluation

## V. Conclusion

The conclusion goes here.

## Acknowledgment

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