## A Control Theoretic Scheme for Efficient Video Transmission over IEEE 802.11e EDCA WLANs

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The EDCA mechanism of the IEEE 802.11 standard has been designed to support, among others, video traffic. This mechanism relies on a number of parameters whose configuration is left open by the standard. Although there are some recommended values for these parameters, they are fixed independent of the WLAN conditions, which results in suboptimal performance. Following this observation, a number of approaches in the literature have been devised to set the EDCA parameters based on an estimation of the WLAN conditions. However, these previous approaches are based on heuristics and hence do not guarantee optimized performance. In this article we propose a novel algorithm to adjust the EDCA parameters to carry video traffic which, in contrast to previous approaches, is sustained on mathematical foundations that guarantee optimal performance. In particular, our approach builds upon (i) an analytical model of the WLAN performance under video traffic, used to derive the optimal point of operation of EDCA, and (ii) a control theoretic designed mechanism which drives the WLAN to this point of operation. Via extensive simulations, we show that the proposed approach performs optimally and substantially outperforms the standard recommended configuration as well as previous adaptive proposals.

Categories and Subject Descriptors: C.2.1 [Computer-Communication Networks]: Network Architecture and Design— Wireless communication

General Terms: Algorithms, Design, Performance

Additional Key Words and Phrases: control theory, EDCA, IEEE 802.11, video transmission

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## 1. INTRODUCTION

IEEE 802.11-based wireless LANs (WLANs) have been widely deployed in the recent years. The use of unlicensed spectrum, the availability of low cost devices, and their ease of management has lead to a plethora of WiFi Access Points, used not only in office environments or as public hot-spots but also to connect residential users and their multimedia devices to the Internet. According to the IEEE

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