AIN SHAMS UNIVERSITY
FACULTY OF ENGINEERING
CAIRO – EGYPT
Electronics and Communications Engineering Department

Quality of Service (QoS) Support for Wi Fi Technology

A Thesis
Submitted in partial fulfillment for the requirements of the degree of Master of Science in Electrical Engineering

Submitted by

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Degree: **Master of Science in Electrical Engineering (Electronics and Communications Engineering)**

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STATEMENT

This thesis is submitted to Ain-Shams University in partial fulfillment of the degree of Master of Science in Electrical Engineering.

The work included in this thesis was carried out by the author in the department of electronics and communications engineering, Ain Shams University.

No part of this thesis has been submitted for a degree or a qualification at any other university or institute.

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PAPER PUBLISHED FROM THESIS

A. N. Omara, Sherine M. Abd El-Kader, Hussein S. Eissa and S. El-Ramly, "**A Prioritized Access Point Algorithm for 802.11b Networks in a Lossy Environment**", Journal of Computing, Volume 2, Issue 5, pp. 53-65, May 2010.

Abstract

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Key word: 802.11b, head of line blocking, quality of service, error-prone channels, binary exponential backoff, VoIP, mean opinion score.

The IEEE 802.11b is becoming more and more popular due to its low cost and easy installation, but unfortunately it does not support Quality of Service (QoS). Basically the MAC protocol of 802.11b treats all types of data traffic in the same way, on first come first served basis or FIFO discipline, regardless of the QoS requirements by the data traffic. The quality of service refers to the capability of a network to provide data transfer with good quality, and it is often measured in terms of the available bandwidth, delay in data transfer and data loss. The QoS requirements of the data traffic vary from application to application. Modern multimedia applications are very sensitive to the available bandwidth, and delay in data transfer, such as, video, audio streaming, Internet telephony and on line network games.

Many studies had been done over the 802.11b technology and proved that the FIFO cannot support the QoS. Beside the inability of the FIFO to prioritize one application traffic over another, it is also causing reduction in the overall performance of the centralized network if there are some transmission failures between the access point and the destination, and this problem is known by the head-of-line blocking problem.

This thesis provides a detailed simulation study using the OPNET simulator for the head-of-line blocking problem within the 802.11b networks. Also, this study tries to clarify some aspects for the problem such as its reasons, its effect

on the performance of the network, and its effect on the quality of some multimedia applications. Finally, this study provides a solution for the head of line blocking using an algorithm that prioritizes the transmissions of the access point which enables the AP to use the available bandwidth efficiently.

This thesis includes seven chapters. Chapter 1 is a quick introduction to the contents of the thesis. Chapter 2 presents the 802.11b technology in details. In Chapter 3, the voice challenges over the 802.11b networks as well as its capacity calculations over the same networks will be discussed in more details. Chapter 4 presents the issues that arise in the lossy environment and presents some efforts that had been done for enhancing the performance of the wireless networks in that environment. Chapter 5 presents our idea for alleviating the effect of the HOL blocking. Chapter 6 focuses on the simulation study and the results. Finally, Chapter 7 shows the final conclusions and introduces some future works.

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