Ain Shams University

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Evaluation of Admission Control Schemes for wireless VoIP

A Thesis

Submitted in partial fulfillment for the requirements of the degree of Master of Science in Electrical 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 Communication Engineering, Faculty of Engineering, Ain Shams University.

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

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Abstract

Call Admission Control schemes are used to prevent congestion in Voice Traffic. It is used during the Call Setup phase to ensure there is Sufficient bandwidth for the authorized flows, Call Admission Control kicks in to reject calls when either there are insufficient CPU processing power, or the Upstream/Downstream traffic exceeds predefined thresholds, or the number of calls being handled exceeds a predefined figure, this will lead to stable service operation and acceptable QoS levels. There are many Call Admission Control schemes which all tried to overcome the problem of “avalanche effect” which is the congestion of network due to increasing of number of connections of VoIP in WLAN but the difference is in the performance which may vary from scheme to another One of these weak performance schemes is the Theoretical Network Capacity Estimation Scheme.

This Thesis focus on two points the first is comparative evaluation survey for admission control techniques for wireless VoIP. A number of papers surveyed dealing with this point and these parameters of comparison are: Downlink Average Frame Error Rate, Downlink Average Access Point Delay, User block rate, Utilization of network, Capacity limit, Voice quality measure R score, Packet loss rate, Delay of voice packets and

percentage of incorrect decisions. The results of our comparison indicated that the major factors which are common in many papers are: capacity limit, percentage of incorrect decisions, packet loss rate and delay of voice packets and the ways to improve these main factors will be illustrated.

Second point is to combine Theoretical Network Capacity Estimation Scheme to a strong performance scheme which is the Transmission Buffer Utilization Ratio Scheme. A simulation model is done to compare the proposed scheme with others. Simulation results have shown that the proposed scheme succeeded in improving the performance of theoretical network capacity estimation scheme and increase number of calls permitted with small and acceptable degradation in performance in the other performance parameters like mean opinion, Frame delay, Throughput and Packet loss.

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Abbreviations

ACK Acknowledgment

AP Access Point

BSA Transmission Buffer Utilization Ratio Scheme

CAC Call Admission Control

CBA Channel Busyness Ratio

CBR Constant Bit Rate

CFP Contention Free period

CP Contention Period

CUE Channel Utilization Estimate

CUE_{Total} Channel Utilization Estimate of number of VoIP connections served

$CUE_{TotalMax}$ de-facto limit of the Channel Utilization Estimate

CSMA/CA Carrier Sense Multiple Access/Collision Avoidance

DCF Distributed Coordination Function

DIFS Distributed Interframe Space

DPCF Dynamic Point Coordination Function