GUIDELINE FOR WIRELESS NETWORK ANALYSIS

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GUIDELINE FOR WIRELESS NETWORK ANALYSIS

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Guideline for Wireless Network Analysis

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Abstract

Though greatly in use, today's Wireless Local Area Networks (WLANs) are far from optimised. The limitation for Access Point (AP) operators to manage and optimise WLAN performance is that current 802.11 standards do not allow AP and clients to share channel information, environmental data, and performance statistics. In order to assist the AP operators to evaluate their network performance and delivered quality, this thesis has proposed an estimate system utilising AP measurements. The estimate system accurately models the MAC-Layer behaviour of an 802.11b network and efficiently calculates the WLAN performance taking into account transmission errors and active rates. Furthermore, the work performed has studied methods on how to improve the estimate system with client information, which may become available to the AP in the near future, due to the release of the 802.11k standard. This thesis also explored the dependence of the WLAN performance on various network parameters such as bit error rate and network size, and provides suggestions for WLAN planning base on this dependence.

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TABLE OF CONTENTS

CHAPTER 4: RESULT AND DISCUSSIONS

CHAPTER 5: INSTRUCTIONS FOR USING THE ESTIMATION MODEL

CHAPTER 6: SUMMARY AND CONCLUSION

LIST OF TABLES

LIST OF FIGURES

CHAPTER 1

INTRODUCTION

1. Introduction

The networking technology known as Wireless Local Area Network (WLAN) has experienced a tremendous growth over the last 10 years. WLAN technology enables the connection of network devices over an air-based interface with the use of radio frequency communications. The standardisation efforts by the IEEE under the IEEE 802.11 family name and the interpretability efforts by the Wi-Fi Alliance have helped the widespread adoption of WLANs by businesses, Small Office Home Offices (SOHOs), and the general public. The ease of deployment of WLANs in extending the existing wired networks or to build new networks from the ground-up, coupled with advances in the Internet technologies, have made it the logical choice for public hotspots, conference centres, and home networking.

The deployment of WLAN-based infrastructures in multiple environments poses challenges to IT architects that are significantly different from those found in similar systems deployed at the enterprise level or in commercial settings (i.e., Hotspots). For example, services offered through a HotSpot are normally subject to a fee whereas in a campus setting these services are free of charge. Also, a variety of users with different needs (e.g., students, departments, administrators, etc.) have to be considered in the design, resulting in different applications and security requirements per user category.

The users will get more consistent network access, fewer disruptions to applications, and faster service, when AP operators are provided the information about the network and clients. Currently, however, the IEEE 802.11b standard does not allow AP and clients to share channel information, environmental data, and performance statistics, which limits the administrators' ability to dynamically optimise the AP's configurations. Thus, finding out the ability of the AP to assess system performance and the delivered service quality, as well as the ability to indicate traffic load would

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