HYBRID LOCALIZATION TECHNIQUES FOR GSM-WCDMA CELLULAR RADIO SYSTEM

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Thesis presented in partial fulfillment for the award of Master of Science in Telecommunication and Information Engineering

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JANUARY 2013

ACKNOWLEDGEMENTS

The special thank goes to my helpful supervisor Dr. Norsuzila Binti Ya'acob. The supervision and support that she gave truly help the progression and smoothness of the work. The co-operation is much indeed appreciated.

My grateful thanks also to my parents both and . A big contribution and moral support during the work period is very great indeed. Great deals appreciated to my wife Nurul Farhana Yanti Binti Abdul Ghani and Son Uwais Farhan bin Ukasyah for being patient in helping me to complete this work.

Last but not least I would like to thank my friends especially those who work together to support me through my struggling

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ABSTRACT

The communication industry have seen a big growth with the telecomunication system itself has evolve from the fixed network to wireless network. The system improvement took place very fast to support demand of users in term of higher throughput and data rates besides to support new services that needs device location information. Mobile devices today has become a very power tool and with the wireless connectivity becoming much more readily available the user of mobile devices as rapidly increase. With the increase of user we are seeing growing demand of infomation and application moving around the network. Location Based Services (LBS) is an important features in the cellular radio network such as Global System for Mobile Communications (GSM), Wideband Code Division Multiple Access (WCDMA) and Long Term Evolution (LTE). There are several mobile station positioning determination techniques for LBS such as Cell-Identification (Cell-ID), Angle of Arrival (AOA), Time of Arrival (TOA), Observed-Time Difference of Arrival (OTDOA), Enhanced-Observed Time Difference of Arrival (E-OTD) and Global Positioning Services (GPS). The accuracy of positioning or localization in such single layer network depend on the Location Determination Technique or Technology (LDT) implemented; the Enhanced Observed Time Difference (E-OTD) in GSM and Observed Time Difference Of Arrival (OTDOA) for WCDMA but subjected to signal hearability from at least three Base Station (BSs) or NodeBs. This paper present hybrid localization techniques for a multilayer or heterogeneous GSM-WCDMA network when a single layer network experience low signal hearability. This can be resolve by gathering at least three signal hearability from multilayer network infrastructure or using previous location information to reduce LDT error. The proposed method has been implemented and evaluated using simulation under various mobility models. Simulation model for the OTDOA, E-OTD and Hybrid techniques was created using MATLAB 7.0 during the work of this dissertation. Simulation shown that the LDT error for hybrid technique can been improved as compared to E-OTD and OTDOA and met E911 requirement.

CONTENTS

CHAPTER I

INTRODUCTION

1.1 INTRODUCTION

The communication industry has seen a big growth with the telecommunication system itself has evolved from the fixed network to wireless network. Wireless communication generation has developed from the first generation (1G) analogue system such as Extended Total Access Communications System (ETACS) and Advanced Mobile Phone System (AMPS) to the second generation (2G) digital system such as Global System for Mobile Communications (GSM). Then followed by the third generation (3G) system such as Wideband Code Division Multiple Access (WCDMA). Nowadays, the fourth generation (4G) system has been develop known as the Long Term Evaluation (LTE). The wireless network has development fast to meet demand of users in term of higher throughput and data rates besides to support new services and application to mobile device.

Mobile devices today have become a very power tool and with the wireless connectivity becoming much more readily available the user of mobile devices has rapidly increase. With the increase of user we are seeing growing demand of information and application moving around the network. Applications on mobile devices with an efficient and highly scalable system architecture are also becoming more reliable to users. Any application on mobile that benefits end users will be a big hit and also a new phenomena to mobile device world. Its shows how powerful an