DEVELOPMENT OF SIMULATION MODEL & ESTIMATED ACCURACY FOR LOCATION DETERMINATION TECHNOLOGY (LDT) USING ENHANCED OBSERVED TIME DIFFERENCE (E-OTD)

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UNIVERSITI TEKNOLOGI MARA

MUHD ZULFADLI BIN ISHAMMUDIN

FACULTY OF ELECTRICAL ENGINEERING

UNIVERSITI TEKNOLOGI MARA

40450 SHAH ALAM

SELANGOR DARUL EHSAN

MALAYSIA

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ABSTRACT

Location related services are described as the next revolution on services and functionality in the mobile network. Location technology will help the operator to estimate the location of a mobile station in the network. But different location services require different accuracy of the location estimate. It is therefore important to find out what location method(s) is suitable for the operators needs.

LBS are expected to spread rapidly due to the rapid growth of mobile devices. In future, the user of this service will be increased. Thus, the focus and objective of this paper is to understand about the services that exist in the LBS and to study about location determination of the MS in terms of the mobility (tracking/non-tracking), the time arrival and the radius of location detection.

This report will give an overview of the most important location technologies for the GSM network on the market today and examples of the most common location services. It will also describe the network architecture needed to implement the E-OTD method.

There is several mobile station positioning determination techniques for LBS. However, the focus of this dissertation is focusing on two methods of Location Determination Technologies (LDT), which are using E-OTD and TOA as comparison. The analysis for the TOA and E-OTD techniques was simulated using MATLAB 7.0. The development simulation model is purposely to estimate the accuracy of E-OTD based on error performance using a sample of channel model. Estimated accuracy using error magnitude of $1x10^{-6}$ s at 70% for TOA is at 330.3 metres and 257.7 metres for E-OTD. Therefore, simulation shows that the accuracy of E-OTD is higher than TOA technique.

TABLE OF CONTENTS

1

Introduction

1.1 What are Location-based Services?

Although *Location-based Services* (LBS) have been an issue in the field of mobile communication for many years, there exists neither a common definition nor a common terminology for them. For example, the terms *location-based services*, *location-aware services, location related services* and *location service* are often interchangeably used. One reason for this dilemma might lie in the fact that the character and appearance of such services have been determine by different communities, especially the telecommunications sector and the ubiquitous computing area.

In research, LBSs are often considered to be a special subset of the so-called *context-aware services* (from where the term *location-aware services* have its origin). Generally, context-aware services are defined to be services that automatically adapt their behaviour, for example, filtering or presenting information, to one or several parameters reflecting the context of a target. These parameters are termed *context information.* The set of potential context information is broadly categorized and, may be subdivided into personal, technical, spatial, social, and physical contexts. It can be further classified as *primary* and *secondary contexts.* Primary context comprises any kind of raw data that can be selected from sensors, like light sensors, biosensors, microphones, location sensors and so on. This raw data may be refined by combination, deduction, or filtering in order to derive high-level context information, which is termed *secondary context* and which is more appropriate for processing by a given context-aware services.