Adaptive and Open-based Model of Mobile Positioning Technology Used in e-Transport System

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Abstract - The e-Transport System has been developed and performed as an extensible platform of information management for transportation. It facilitates service access through internet and wireless mobile technologies. The system implementation depends on two core embedded technologies, i.e., positioning technology and geographic information system. With adaptive and open-based concept of positioning technique, the location-based services (LBS) and fleet management system can be implemented. Furthermore, geographic information system (GIS) serves to provide better visualization of positioning and LBS services associated. Global positioning system (GPS) is mostly used for location positioning in transportation industry. However, the constraints such as system complexity and heavy investment of infrastructure have narrowed its applications in tracking and locating the fleet vehicles for transport systems. Hence a low-cost, adaptive and flexible solution of positioning is proposed for the current wireless technology of 2G, 2.5G and even coming up 3G cellular network systems.

Keywords: Mobile positioning, fleet management, LBS, GIS, adaptive and open-based system, transportation

1 Introduction

Tourism industry is one of the core industries in Sarawak and it is very much dependent on the transportation and information sectors. The transportation in Sarawak, however, is severely limited by lack of information and systematic transportation system. Hence e-Transport system is developed and performed as a platform to link up all transportation system operations and resources, and facilitate various services through broadband internet and wireless mobile technology. The public transport has been taken into consideration in this project include inter-division express buses and boats, taxis, and local bus services.

Apart offering IT-based management of transportation system, e-Transport System has embedded with mobile positioning technology for its low-cost fleet management and adaptive and open-based location-based system (LBS) services. The cellular network-based fleet management provides lower cost solution for fleet vehicle positioning and tracking compared to GPS-based or other heavy capital investment solutions [1]. Furthermore, e-Transport System also acts as an adaptive and open platform to offer LBS services to its users.

The outline of the paper is as follows: The second section describes the needs of information technology in transportation especially in terms of fleet management and positioning technology. This is followed by the discussion of the prevalent problems of the information management in its current state. Finally, a framework of positioning solution is proposed to enable fleet management and LBS services in e-Transport system.

2 Information technology in transportation industry

The last few decades has witnessed many changes in information technology. The way information is managed can have a profound impact in the way we live [2]. This is also true in the context of transportation industries.

One of the goals within the transportation industry is to commute the maximum load (either people or goods) at a minimum cost from points A to B. Apart from that, location-based services (LBS) that comes with the industries, which provides guided information, e.g. weather, bus route and schedule, eateries, fuel stations, museums etc. to travellers, is also a key area of interest to public.

Currently, mobile positioning technology is the only solution that offers the technology for transport operations to become a location-aware service. Among those positioning technologies, GPS offers the most attractive and successful solution in most of the navigational applications. Other solutions such as handset-based, network-based and hybrid positioning technologies are offered by mobile cellular network operators. By using wireless communication devices, one could obtain personalized information, messaging, entertainment and other location-specific travel and security services [3, 4]. Positioning technology alone is not enough to meet the demand of information exchange and thus integration with other related system is essential to ensure success. This system is the Geographic Information System (GIS).