

## A K-Anonymous Location Privacy-Preserving Scheme for Mobile Terminals

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### Abstract

Mobile terminals boost the prosperity of location-based service (LBS) which have already involved in every aspect of People's daily life and are increasingly used in various industries. Aimed at solving the security and efficiency problem in the existing location privacy protection schemes, a K-anonymity location privacy preservation scheme based on mobile terminal is proposed. Firstly, number of rational dummy locations is selected from the cloaking region, from which more favorable locations are further filtered according to location entropy, so a better anonymity effect can be achieved. Secondly, the secure and efficient m-out-of-n oblivious transfer protocol is adopted, which not only avoids the dependency on the trusted anonymity center in existing schemes to improve the efficiency, but also meets the requirements for querying multiple interest points at one time. Security analyses demonstrate that this scheme satisfies such security properties as anonymity, non-forgability and resistance to replay attack, and simulation results show that this scheme has higher execution efficiency and privacy level, while is low in communications costs.

**Keywords:** Location-based service, K-anonymity, Privacy protection, Mobile terminals

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### 1. Introduction

Along with the development of computer technology, global positioning systems and wireless communication networks, location-based service (LBS) technology [1][2][3] has become increasingly popular. Location-based service, LBS, refers to a location service provider that obtains the location of a device through various types of positioning technologies and provides the device with specific services requested by the device via the Internet. Its typical applications include vehicle navigation, online taxi hailing, takeout and ticketing services, etc. It not only brings great convenience to users, but also causes some changes in people's daily behavior. However, as users become increasingly dependent on LBS, private location privacy may as well at a great risk of disclosure accordingly[4][5].

When applying for LBS, mobile user needs to submit its current location and query information to LBS server in real time, which may help to establish user's location trajectory based on the temporal-spatial relationship. Thereby, this user's location trajectory can be employed to infer user's whereabouts, family address, and work place, so as to further obtain such privacy information as religious belief, living habits, medical information[6][7], etc. If such privacy information is obtained by any attacker, then user's location-related privacy is at great risk of disclosure. Consequently, location privacy protection technology is one of the research focuses in current field of mobile network security.

Focusing on the problem of location privacy protection, this paper employs both K-anonymity technique and Oblivious Transfer (OT) protocol to propose a K-

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