

Available online at www.sciencedirect.com

ScienceDirect

journal homepage: www.elsevier.com/locate/cosrev

Survey

Location management in mobile network: A survey



Anwesha Mukherjee, Debashis De*

Department of Computer Science and Engineering, West Bengal University of Technology, B.F.-142, Sector-I,
Salt Lake, Kolkata-700064, West Bengal, India

HIGHLIGHTS

- Different types of location management schemes for mobile network are discussed.
- The location management cost in terms of message is calculated for these schemes.
- Comparative analysis is performed between the methods based on cost.
- Future scopes of location management are also explored.

ARTICLE INFO

Article history:

Received 27 July 2015

Received in revised form

13 December 2015

Accepted 21 December 2015

Published online 26 February 2016

Keywords:

Location update

Paging

Cost

Macrocell

Femtocell

ABSTRACT

Location management is an important area of mobile computing. Location management in mobile network deals with location registration and tracking of mobile terminals. The location registration process is called location update and the searching process is called paging. Various types of location management methods exist such as mobility based location management, data replication based location management, signal attenuation based location tracking, time, zone and distance based location update etc. In this paper, existing location management schemes are discussed and compared with respect to their cost consumption in terms of bytes. Finally the key issues are addressed in the context of location management for future generation mobile network.

© 2016 Elsevier Inc. All rights reserved.

Contents

1. Introduction	2
2. Location management strategies.....	3
2.1. Location management for traditional GSM network	3
2.2. Multi-layer location update scheme.....	3
2.3. Timer, zone and distance based location registration scheme	4
2.4. Classical strategy for location management	4
2.5. Signal attenuation based location tracking method	4

* Corresponding author.

E-mail address: dr.debashis.de@gmail.com (D. De).<http://dx.doi.org/10.1016/j.cosrev.2015.12.001>

1574-0137/© 2016 Elsevier Inc. All rights reserved.

2.6.	Mobility and replication based location management	4
2.6.1.	Mobility based location management.....	4
2.6.2.	Replication based location management.....	8
2.7.	Comparison between mobility based and replication based location management schemes.....	9
2.8.	Location management for femtocell based mobile network	9
3.	Future scope of location management.....	12
4.	Conclusion.....	12
	Acknowledgment.....	13
	References	13

1. Introduction

In a Personal Communication Services (PCS) network, the service area is partitioned into several location areas [1–5]. Each location area (LA) consists of several base stations. The coverage area of a base station (BS) is known as cell. The location information of mobile terminals (MTs) is maintained in databases of two types: Home Location Register (HLR) and Visitor Location Register (VLR). The process of tracking the location of a MT is referred as location management [6–10]. Location management is composed of two main processes: location registration and paging [11–14]. In this paper we have discussed on various kinds of location management schemes with their advantages and disadvantages to minimize the location registration as well as paging cost. The cost is measured in terms of messages or bytes. The registration process by reporting its own up-to-date location by the MT is called location update [15–19]. Whenever a MT enters into a LA, a location update is performed [20–24]. To deliver an incoming call to a MT, the current location of that MT is required. Location update [25–29] is performed using one of the following three methods:

- a. Send location update on every cell update: Every time a MT moves into a different cell area, a location update is performed. This scheme has the following advantage and disadvantage:
 - Advantage: No paging requirement,
 - Disadvantage: Excessive signaling traffic load.
- b. Page every cell in the network: Every time an incoming call is to be routed to a MT, all cells of the network are paged to identify the cell owning the MT. It has the following advantage and disadvantage:
 - Advantage: No location update requirement,
 - Disadvantage: Excessive signaling traffic load.
- c. Subdivide network into paging sub-regions: Every time a MT moves to a new paging sub-region, it informs the identity of that sub-region to the network. When an incoming call arrives for that MT, only the cells of the current sub-region are searched to identify the cell owning the MT. It has the following requirements:
 - Requires paging procedure with reduced traffic load,
 - Requires location updating procedure with reduced traffic load.

At arriving of an incoming call, the network searches the called MT; this process of searching is referred as paging. Paging processes are of various types as shown in Table 1.

- a. Terminal paging: In terminal paging, the exact location of a particular MT is determined for a terminated call; the system needs to determine the set of cells, where the MT may have entered [11]. The paging process gets finished as soon as that MT replies before timeout. Else another group of cells are selected for the next paging cycle.
- b. Blanket paging: In this case, all the cells within the current LA of the MT are searched simultaneously when a call arrives for it.
- c. Shortest-distance first paging: In this case, the MT is searched in a shortest-distance first order starting from the last-updated cell. The distance is the number of cells traveled from the last updated location.
- d. Sequential paging based on user's location probability: In this case, the location probability distribution of the MT is used to predict the current location of that MT.
- e. Velocity paging: In this case, the users are clustered into several velocity classes on the basis of their velocity at the instant of location update. When a call arrives for a MT, the paging area is generated dynamically based on the last location update time of the MT and the velocity class index.
- f. System wide paging: System wide paging simply pages all the cells in the system looking for a particular MT. It is the simplest paging method, but the most expensive one. This method has been abandoned in current cellular systems because of high cost [6].
- g. Location area based paging: In this scheme, all the cells in the current LA of the MT are searched. This method requires the location area registration method to cooperate with it. This scheme has been adapted by several cellular phone network implementations for its acceptable delay at field test [6].
- h. Selective paging: This paging process consists of iterative steps. In each step, a subset of cells is selected for paging according to a predetermined criterion (e.g. distance). The paging process terminates as soon as the MT is found [6].

For better prediction of user movement pattern, two kinds of information are recorded in the profile of the user:

- (i) Long term: It contains slow changing information of the user and it is concerned of only the long periods of time such as weeks, months.
- (ii) Short/medium term: It contains information about the recent behavior of the user in terms of day or hour.

We have already discussed that each LA contains a number of cells. Cells are categorized into four types based on the amount of coverage area [30]:

Download English Version:

<https://daneshyari.com/en/article/470043>

Download Persian Version:

<https://daneshyari.com/article/470043>

[Daneshyari.com](https://daneshyari.com)