CCIT Report No. 321

Efficient Location Management Based on Moving Location Areas

Yigal Bejerano and Israel Cidon

ABSTRACT

Personal Communication Systems (PCS) maintain a *Location Management* mechanism for tracking the location of their mobile users. The increasing population of mobile users leads to congestion problems in these systems, and motivates the development of more efficient management schemes. This work presents a new mobility management scheme that integrates the location area approach with the location prediction idea. It is based on results from traffic flow theory and it is first that uses the concept of moving location areas. Traffic flow theory suggests that people tend to reside in specific places for long periods of time. Occasionally, they move to new locations and try to minimize the travel time using highways as much as possible. The scheme uses two complement sets of location areas that overlap each other. The first set contains small location areas and is designated for locating mobile users in a quasi-static state. The second set covers the highways and it is designated to track mobile users while they are traveling from place to place, where each highway is covered by a single location area. The dual set design enables tracking mobile users at a high degree of accuracy with low update cost while they are quasi-static state, and reduces the amount of update operations when they travel. For tracing mobile users on a highway, the scheme uses a system of moving location areas. A *moving location area* (MLA) is a small location area that defines the location of a group of mobile users, which are geographically concentrated and move in the same direction. The scheme guarantees low rate of update and search operations at each cell of the system and efficiently utilizes the radio spectrum and the network resources with low computational overhead. This advantages are also backed by simulation results.