ELS: Energy-Aware Some-for-Some Location Service for Ad Hoc Mobile Networks

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Abstract. In this paper, we propose a new location service for Ad hoc mobile networks. The network area is divided into non-overlapping zones. Using a hash function, a node identifier is mapped to a set of zones, in which the location information of the node are stored. We also propose a location information distribution scheme that achieves low rate of outdated location information. Using cross-layer design, the service can tolerate servers mobility and failure, and last for a long time period. Simulation Results show that the proposed location service experiences low overhead and high location information availability and accuracy.

1 Introduction

A mobile ad hoc network is a collection of mobile nodes forming a temporary network without any form of centralized administration or predefined infrastructure. Each node acts both as a host and a router. Due to mobility, the network topology changes frequently, which makes the design of a scalable and robust routing protocol with low message overhead one of the challenging tasks in such a network.

In recent years, location-awareness is increasingly becoming an important feature of routing protocols and applications. Position-based routing protocols [3,11,9,7,13,18] use the geographic position of nodes available from positioning systems such as GPS [8] or other type of positioning service [1,4,2] to forward data packets. In contrast with topology-based category, they do not need to keep global states for routing data packets. To enable position-based routing, a node must be able to discover the location of the node whom it wants to communicate with. Thus, they have the advantage to scale to a larger number of nodes. Location information are provided by a so-called location service. The use of location services extends to other location-aware applications, e.g., location tracking and navigation, geocasting, or a tour guide that can provide location-dependent information to tourists (such as map, traffic, and site information). The effort needed to search for tourism information can be significantly reduced with the help of positioning.

The role of a location service is to map the ID of a node to its geographical position. Each location service performs two basic operations: the *location update* and the *location query*. The location update is responsible for distributing

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