Abstract

An ad-hoc network is a collection of mobile nodes forming a temporary network without any form of centralized administration or predefined infrastructure. In such a network, nodes move freely and their batteries drain out quickly. These lead to frequent network partitions, which may significantly degrade data and service availability. In such circumstances, replicating data or services at multiple nodes may improve data availability and response time.

In this thesis[1], we propose six localized replication protocols for mobile ad-hoc networks, where each node can make decision based only on the information from nodes within a constant hop distance. Network partitioning, energy consumption, and scalability are the three major issues that are considered in the design of these protocols. We first propose two partition prediction algorithms, the first one is for a single topology change and the second one is for concurrent topology changes. The algorithms can determine the time at which network partitioning might occur and replicate data items and services beforehand. We then propose three location-based data replication protocols that can achieve a good balance between scalability and availability. The last protocol we propose is based on clustering approach, where each node can send update and query messages to a cluster-head node that is within a constant hop distance.

Our simulation results and analytical studies show that the proposed replication protocols experience low cost, high data and service availability, and high data accuracy.

Keywords: localized replication, location-based protocol, partition prediction algorithm, availability, accuracy, scalability.

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