

Advances in Mobility Management for IP Networks

Editors:

Aisha Hassan Abdalla Hashim

Othman Khalifa

Shihab A. Hameed



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POSITION-BASED ROUTING PROTOCOLS FOR AD-HOC NETWORKS

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34.1 INTRODUCTION

The function of a routing protocol in mobile Ad-Hoc network is to establish routes between different nodes. Ad-Hoc routing protocols are difficult to design in general. There are two main reasons for that; the highly dynamic nature of these networks due to high mobility of the nodes, and the need to operate efficiently with limited resources such as network bandwidth and limited memory and battery power of the individual nodes in the network. Moreover, routing protocols in Ad-Hoc networks, unlike static networks, do not scale well due to frequently changing network topology, lack of predefined infrastructure like routers, peer-to-peer mode of communication and limited radio communication range [1].

For the aforementioned reasons, many routing protocols which are compatible with the characteristics of Ad-Hoc networks have been proposed. In general, they can be divided into two main categories: topology-based and position-based. Topology-based routing protocols use information about links that exist in the network to perform packet forwarding. In general, topology-based are considered not to scale in networks with more than several hundred nodes [2].

In recent developments, *position-based* routing protocols exhibit better scalability, performance and robustness against frequent topological changes [1, 2]. Position-based routing protocols use the geographical position of nodes to make routing decisions, which results in improving efficiency and performance. These protocols require that a node be able to obtain its own geographical position and the geographical position of the destination. Generally, this information is obtained via Global Positioning System (GPS) and location services. The routing decision at each node is then based on the destination's position contained in the packet and the position of the forwarding node's neighbors. So the packets are delivered to the nodes in a given geographic region in a natural way. There are different kinds of position-based protocols that are categorized into three main groups: *restricted directional flooding*, *greedy* and *hierarchical routing protocols*[3].