

QUALITY OF SERVICE ISSUES IN MOBILE AD- HOC NETWORK

THESIS

Submitted in fulfillment of the requirement for the award of the degree

Of

DOCTOR OF PHILOSOPHY
(In Computer Engineering)

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2007

ABSTRACT

A Mobile ad hoc network (MANET) is a collection of wireless nodes, all of which may be mobile, that dynamically create a wireless network amongst them without using any infrastructure. Projected applications of such networks include defense based applications (war scenarios), disaster relief operations (earthquake, rural areas) and commercial applications (home networking, extending Internet connectivity). Many of these applications require a distinction in the quality of connections being supported in terms of bandwidth availability, end-to-end delay and jitter. For such applications, the need of Quality of Service (QoS) routing is impervious.

Quality of service is more difficult to guarantee in ad hoc networks than in most other type of networks, because the network topology changes as the nodes move and network state information is generally imprecise. This requires extensive collaboration between the nodes, both to establish the route and to secure the resources necessary to provide the QoS. Issues like limited availability of resources, insecure medium make QoS provisioning very challenging in such networks. The traditional MANET routing protocol does not employ power aware routing as well as feasible security features making QoS provisioning difficult.

In this thesis we propose algorithms inspired from swarm intelligent behaviour of ants that performs power aware and secure routing. The proposed algorithms are dynamic routing algorithms with controlled routing overheads. The routing packets are concentrated in the best path regions. This allows better optimization with lower number of packets. In addition, old explored, unexplored, and bad region are visited with lower rate. The algorithms are self-built and self-configured optimization algorithms that match the characteristics of MANETs. The algorithms can use different parameters in the optimization process.

In these algorithms we have introduced a new metric, next hop availability, which is a combination of two metrics. It maximizes path availability and minimizes travel time of packets and therefore offers a good balance between selection of fast paths and a better use of network resources. The algorithm has the availability to continuously check for better paths in the network with controlled overheads, which make the algorithms more suitable for network resources management. The protocol also incorporates a trust model which helps in detection of unauthorized and compromised nodes in MANETs. The protocol can detect most of the attacks, which are common to ad hoc network routing protocols. Moreover the protocol is capable of discovering secure as well as the most power-optimized path for dynamically changing topology. We present simulation results to validate the proposed protocol. Results of simulation are also compared with the existing protocols. The comparative analysis clearly shows that there is an improvement in performance over the traditional protocols used for routing in MANETs.