ABSTRACT

A SCALABLE AND SECURE POSITION-BASED ROUTING PROTOCOL FOR AD-HOC NETWORKS

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*Mobile Ad-Hoc NETworks (MANET*s*)* are wireless multi-hop networks formed by a set of mobile nodes in a self-organizing way without requiring already established infrastructure. Along with their traditional uses such as disaster situations and military battlefields, *MANET*s are being increasingly used in daily applications such as conferences, personal area networking and meetings. Routing in *MANET*s is a challengeable task due to limited bandwidth of wireless links, highly dynamic topology, limited radio transmission range and limited nodes' energy. Though security issues could arise in numerous areas in *MANET*s such as physical security, key management and intrusion detection, routing is considered as one of the most difficult areas to protect against attacks. This is due to lack of centralized control, open medium, distributed cooperation, dynamic topology as well as limited capability of nodes.

In our research, we tackle security issues related to Ad-Hoc routing protocols. A new model of hierarchal and distributed routing protocol called *ARANz* has been proposed in our work. *ARANz* aims to improve performance of the routing protocol and distribute routing load by dividing the area into zones. It seeks to achieve a high level of security and attain robustness by avoiding the single point of attack problem and solving the problem of single point of failure as a result of distributing trust among multiple certificate authority servers. *ARANz* aspires to exhibit better scalability and performance by taking advantage of the restricted directional flooding position-based routing protocols. Thus, in conjunction with the chosen routing strategy, a distributed location service has been proposed. Along with the proposed protocol a misbehaviour detection system is proposed to help in identifying malicious nodes.

The performance of *ARANz* is compared to other existing routing protocols and tested using the *Global Mobile information systems Simulator (GloMoSim)*. From the results analysis, it shows that *ARANz* is highly effective in discovering and maintaining routes even with relatively high node mobility and large percentage of malicious nodes. It is also demonstrated that the proposed protocol performs efficiently in large area networks.