UNIVERSITY COLLEGE LONDON

Department of Computer Science
MSc DCNDS

Executive Summary

JMS Implementation for MANETs using Sociable nodes (JIMS)

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Executive Summary

Mobile ad hoc networks (MANETs) have a growing number of applications. MANET applications such as military and emergency services demand reliability. Hence, reliability is key to deployment of MANETs. Reliability may be achieved at the application level or at the middleware level. The former makes application development complex.

Middleware technologies have made application development easy in traditional wired networks. Hence, a similar approach can make application development easy and economical for MANETs.

However, existing middleware technologies are not directly portable on MANETs because of the complicated nature of a MANET environment. Hence, MANETs have different non-functional requirements and the middleware should be able to cater to these.

Due to the fact that disconnection is the norm rather than the exception, asynchronous communication semantics are most suitable in MANETs. These semantics are provided by Message Oriented Middleware (MOM) for traditional wired networks. Java Messaging Service (JMS) APIs is one of the most popular ways for implementing messaging systems, which also supports different levels of reliability according to message priority.

Hence, the team has exploited cross-layering solutions and implemented JMS semantics for MANETs in the form of a "context-aware" routing algorithm implemented at the middleware layer. The algorithm, JMS Implementation for MANETs using Sociable nodes (JIMS), leverages both the resources and the mobility pattern of the nodes in the network. Nodes i.e. mobile devices, like laptops, which have high memory and power resources and "meet" a lot of nodes in the network are said to be "sociable". The team maintains the queue/topics semantics of JMS and "spread" messages in the network by using sociable nodes. Both Publish/Subscribe and Point-to-Point models have been implemented. JMS APIs may be used for application development with JIMS running underneath.

JIMS has been implemented on a discrete event simulator, OMNeT++. Through simulation, we demonstrate a good performance of JIMS for both the Publish/Subcribe and Point-to-Point models. Both models have been evaluated using two mobility models, Random Waypoint (RWP) and Sociable-founded Group Mobility Model (GMM).

The team has also implemented a prototype, which demonstrates the practical application of the algorithm. The team has implemented the basic JMS APIs of the Publish/Subscribe model, which is used to develop a simple SMS type application, with a JIMS daemon running underneath.