

Project summary

Research

The research undertaken for the project was investigating mobile adhoc networks (MANETs), specifically MANETs using the Adhoc On-demand Distance Vector (AODV) routing protocol. This work was based on previous research done as part of a URSS research project by Anthony Dawson and Richard Myers. The work done by Anthony and Richard was based around the concept of trust in MANETs. A modified protocol based on AODV was created that used trust as means of deciding how to route traffic in the network. Work was done to see whether the trusted AODV protocol performed better in the presence of malicious nodes than the original AODV protocol did.

Testing of routing protocols was done using the NS2 network simulator. NS2 is a discrete event network simulator and is one of the most widely used tools of its kind.

The work done this summer extended this research by investigating the performance of MANETs using the trusted AODV routing protocol in the presence of faulty nodes. Faults were injected into the trust table used by the trusted AODV protocol. These trust tables record information about how trusted different nodes in the network are. Several classes of faults were tested, these are described below.

- All trust values were set to random numbers
- A set amount of entries that had trust values below a certain value had their values increased to the maximum trust value
- A set amount of entries that had trust values above a certain value had their values decreased to the minimum trust value
- The first entries found in the trust table that were below a certain value had their trust values increased to the maximum trust value
- The first entries found in the trust table that were above a certain value had their trust values increased to the minimum trust value

All of these fault classes were also modified to cause values to become “stuck”. In the original fault classes the values changed by fault injections could be updated again by the routing protocol, but with the “stuck values” the values changed by fault injections can never change again. These stuck values can be seen as simulation of hardware failures in the memory used by the routing protocol.

The outcome of these tests is that the trusted AODV protocol does seem to be able to withstand the presence of faulty nodes in the network, but further analysis of the results is needed to judge to what extent it can.

Work was also done on measuring the effects malicious nodes in MANETs have on the buffers used in the trusted AODV routing protocol. These buffers are used to temporarily store packets that the routing needs to send whilst it does not have a route to the destination node. The simulations have been run, but analysis of the results is yet to be performed.

Reflections on the project

Through undertaking this project I have learnt many things about the research process. I have learnt about the importance of presenting data well and performing analysis upon it, and also how the peer review system works for academic papers. The project has improved my programming skills in C++ and Perl, which should be transferable to many jobs or research work that I may be involved in in the future. I have also learnt a great deal about how MANETs and networks in

general work and the problems involved in designing protocols for them.

The work I have undertaken will certainly be useful to me in the future if I continue working in computing. There are plans for several research papers to be produced through the work done through this project which should help with future employment or research. The research and practical skills I have learnt will also be helpful.

Supervisor's comments

Jack has investigated various performance aspects in routing in MANETs. The research has resulted in some interesting results that will need further investigation. Jack has shown to be a very good programmer, and he also had good insights into the problems that were being investigated. He displayed a good command of the tools that were relevant.