Analysis of Packet Flooding in Dense MANETs using a Probabilistic Model

S. J. Sooriyaarachchi*, W. A. C. Fernando**, C. D. Gamage*

Department of Computer Science and Engineering, University of Moratuwa, 10400, Sri Lanka

**Centre for Vision Speech and Signal Processing (CVSSP), Faculty of Engineering and Physical Sciences,*

University of Surrey, Guildford, Surrey, GU2 7XH

sulochanas@cse.mrt.ac.lk, w.fernando@surrey.ac.uk, chandag@cse.mrt.ac.lk

Abstract—Flooding is a decisive aspect of mobile ad hoc networks. A number of efficient flooding schemes have been proposed to suppress redundant rebroadcasts as simple flooding causes broadcast storm problem. For example, a cellular automata based flooding scheme inspired by the organ growth control in cell biology is proposed in [1]. These protocols may fail to reach all the nodes for global broadcast in the process of suppressing the redundant rebroadcasts. Though the protocols are evaluated using simulations extensively it is essential to develop a robust theoretical model to analyze and compare performance of different flooding protocols. However there is only a little work in this area. In this research, we base on Viswanath-Obraczka [2] and the underlying Wu-Varshney [3] models that theoretically analyze reachability in multihop flooding in mobile ad hoc networks. We applied the model to a sample scenario and the analysis shows that flooding fails to reach all the nodes in the network in the presence of hidden terminal problem and collisions. The reachability was found to increase asymptotically with the increasing number of retransmission and the parameters can be tuned to improve the reachability.

Keyword—MANET, Probabilistic Model, Reachability.

S. J. Sooriyaarachchi was born in Anuradhapura, Sri Lanka on the 18th of October 1981. She obtained her BSc Eng. (Hons) in Electrical and Electronics Engineering from the University of Peradeniya, Sri Lanka in 2006. She then joined the Department of Computer Science and Engineering in the University of Moratuwa as a lecturer and obtained her MSc in Computer Science from the same department in 2010. She is currently pursuing her PhD in the University of Moratuwa conducting research in the area of routing and control mechanisms in mobile ad-hoc networks.
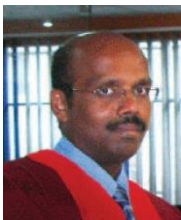
W. A. C. Fernando leads the Video Communications group at the University of Surrey, UK. He has been working in video coding and communications since 1998 and has published more than 270 international refereed journal and proceeding papers in this area including a book on video communications. Furthermore, he has published more than 150 international refereed journal and conference papers in multimedia communications. He has contributed to several international (ROMEO, MUSCADE, DIOMEDES, VISNET, etc) projects and currently he is leading an interactive video communications project (ACTION-TV) funded by the European Union on Media communications.

C. D. Gamage is a senior lecturer in the Department of Computer Science and Engineering, University of Moratuwa, Sri Lanka. He received his PhD from Monash University, Australia, MEng from AIT, Thailand and BSc Eng Hons from University of Moratuwa and worked as a postdoctoral research scientist in Vrije Universiteit Amsterdam, The Netherlands. Dr Gamage has research interests in computer security and cryptography, enterprise software architectures and embedded systems and has published in leading conferences in these areas.