

Surrendering Autonomy: Can Cooperative Mobility Help?

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Abstract. In this paper, we develop a Cooperative Mobility Model that captures new salient features of collaborative and mission-oriented MANETs. In particular, the cost-benefit framework of our model is a significant advance in modelling heterogeneous networks whose nodes exhibit the complete range of autonomy with respect to mobility. We then describe the design of CoopSim, a platform for conducting simulation experiments to evaluate the impact of parameter, policy and algorithm choices on any system based on the proposed Cooperative Mobility Model. We present a small but illustrative case study and use the experimental evidence derived from it to give an initial evaluation of the merits of the proposed model and the efficacy of the CoopSim software. In our case study, we propose studying the impact of the proposed model on improving the end-to-end communication based on the QoS parameter, namely BER.

Key words: Cooperative model, mobility, QoS, MANETs

1 Introduction

The potential applications of MANETs have led, perhaps not surprisingly, to a surge in research breakthroughs addressing the many technological challenges which stand in the way of their wide scale adoption. The many challenges include the limitations of wireless RF channels in terms of available bandwidth and relatively high bit error rates, energy-efficient communication to extend the network lifetime, QoS aware routing to meet application requirements, and the design of new protocols to support large networks and handle the limitations of the underlying wireless RF links.

On the applications side, the demanding requirements of end users in the military and public-safety sectors have led to the development of a variety of unmanned platforms [1]. More specifically, end-user demands have driven the development of Unmanned Ground Vehicles (UGVs) and Unmanned Air Vehicles (UAVs) for use within battlefield and public safety missions, e.g. the UAV-Ground Network [2]. These devices are mobile, mission capable, and can be

age mobility in MANETs under the Cooperative Mobility Model, and further evaluate their scalability and performance using both analytic techniques and realistic simulation experiments.

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