

Mobility Aware Routing for the Airborne Network backbone

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ABSTRACT

The airborne network (AN) will form an essential part of the global information grid in the future, thus providing information and decision superiority to US armed forces. AN is an enabling technology for network centric warfare. AN is different from the terrestrial mobile ad-hoc networks (MANETs) and the wire-line internet, both in terms of network capability and underlying assumptions. The backbone nodes of the AN are envisioned to fly in pre-planned orbits whose knowledge can be exploited for efficient routing. In this paper we propose a dynamic adaptive routing protocol that uses known trajectories of the AN nodes to enhance performance. Our routing protocol has two components: (1) a Mobility Aware Routing Protocol (MARP), that routes traffic based on the knowledge of network topology with respect to time and makes preemptive decisions to minimize packet losses due to link failure and discover better routes, and (2) a Mobility Dissemination protocol (MDP) that informs all network nodes of any deviation from the preplanned behavior. We analyze MARP/MDP protocol suite using the QualNet network simulator for representative AN deployment scenarios and compare performance with proactive and reactive MANET routing protocols. We use packet delivery ratio, end-to-end latency and control overhead as performance metrics. We also analyze the performance of the MARP/MDP routing protocol for varying degrees of prediction accuracy. This work is part of an ongoing Phase II Small Business Innovation Research program administered by the Air Force Research Laboratory/Information Directorate in Rome, New York.