

# Utilizing Beamforming Antennas for Improving the Performance of Mobile Wireless Mesh Networks

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## Abstract

Wireless Mesh Networks (WMN), which features infrastructureless flexible broadband network configurations, is attracting attention as an elemental technology for future ubiquitous networks consisting of various types of nodes. Mobile WMN is an extended feature of WMN which could be built on ad-hoc basis while nodes are moving. We are proposing a mobile WMN which utilizes beamforming antenna for improved performance by means of cross layer mechanisms concentrating on multi-radio aspects. To solve problems like throughput degradation and delay, an enhanced MAC protocol is needed using directional antenna that enables cross-layered coordination with routing and congestion control. This research work is expected to help improving the known communications limits of mobile communications, and will lead to the development of prototypes applicable in vehicular communications and intelligent environments.

This presentation will cover the first year of the research work which has concentrated on classification of various MAC protocols from the literature, and implementation of a directional antenna together with an existing MAC protocol over NS2. Simulations were done to gauge the performance of the directional antenna compared with omnidirectional antenna in a 3 x 3 grid network in terms of throughput, delay and fairness. The results have shown directional antenna have improved the performance of network relative to omnidirectional antenna, where the average network throughput have increased approximately 16% and the average network delay have reduced by ~31% while maintaining fairness at same level. These results are significant as the omnidirectional antenna operated at 158mW (22dBm) while the directional antenna transmitted at 25% of the total power used for transmission by omnidirectional antenna at 40mW (16dBm). Thus, directional antenna not only improves the performance of WMN but also an efficient energy saving mechanism.