On the Stability of Load Adaptive Routing Over Wireless Community Mesh and Sensor Networks

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***Abstract*—Wireless mesh networks are increasingly deployed as a flexible and low-cost alternative for providing wireless services for a variety of applications including community mesh networking, medical applications, and disaster ad hoc communications, sensor and IoT applications. However, challenges remain such as interference, contention, load imbalance, and congestion. To address these issues, previous works employ load adaptive routing based on load sensitive routing metrics. On the other hand, such approach does not immediately improve network performance because the load estimates used to choose routes are themselves affected by the resulting routing changes in a cyclical manner resulting to oscillation. Although this is not a new phenomenon and has been studied in wired networks, it has not been investigated extensively in wireless mesh and/or sensor networks. We present these instabilities and how they pose performance, security, and energy issues to these networks. Accordingly, we present a feedback-aware mapping system called FARM that handles these instabilities in a manner analogous to a control system with feedback control. Results show that FARM stabilizes routes that improves network performance in throughput, delay, energy efficiency, and security.**

***Keyword*—wireless mesh networks, sensor networks, load adaptive, routing, and routing stability.**

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