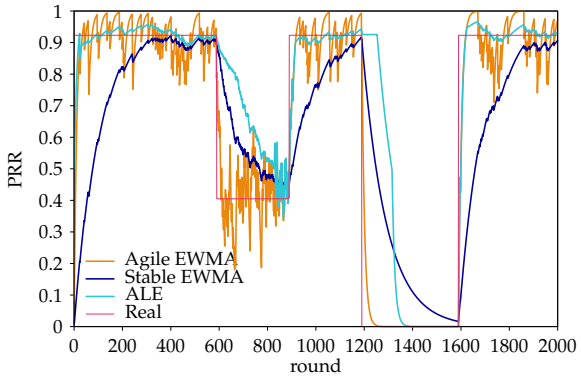
Bachelor Thesis

« Mahalle: Connectivity-Aware Neighborhood Management Protocol for Wireless Sensor Networks »

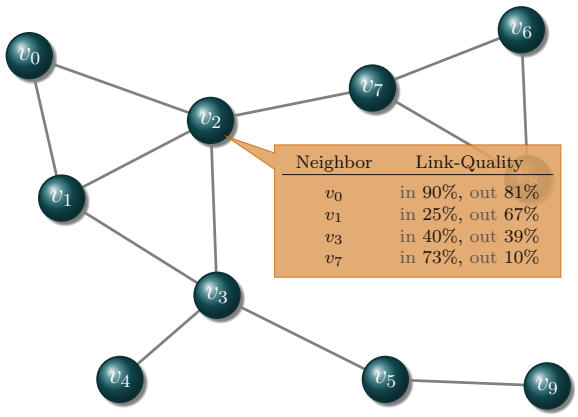
Background

Wireless sensor nodes are subject to extensive research. They can be used for monitoring to derive models of real-world phenomena or to directly respond to events sensed in the environment. For both purposes, nodes need to communicate with neighboring nodes in order to forward, share, or exchange information. In many scientific studies, it is assumed that nodes are somehow aware of their neighbors. However, obtaining this knowledge is not an easy task: Real-world deployments have shown that link quality is hardly predictable in wireless sensor networks and changes frequently: Wireless communication links, and thus neighbors, are instable. Hence, nodes must employ a protocol in order to identify neighbors and keep track of them. This particularly involves estimation of link qualities for both receiving from and sending to neighbors.



Work Description

A novel approach to this problem, Mahalle, has been proposed and evaluated by simulation at the Institute of Telematics at the TUHH. As simulation results are promising and prove Mahalle's superiority to existing solutions, it is desirable to port Mahalle to real sensor nodes, e.g, the XBow Iris nodes using TinyOS. In addition, Mahalle requires an important improvement. It relies on periodic message exchange (via broadcasts) and is neither capable of adjusting the periodicity nor of shutting down completely, if stable links are identified. This behavior is however mandatory, as a continuous neighborhood management wastes energy resources and steals a share of the restricted wireless channel. Solving both challenges, porting and extending Mahalle, will be your task! Furthermore, the developed solution is to be evaluated via simulation and a realistic testbed. Results obtained from both experiments shall be compared.



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