Demonstrating H-NAMe

A Hidden-Node Avoidance Mechanism for Wireless Sensor Networks

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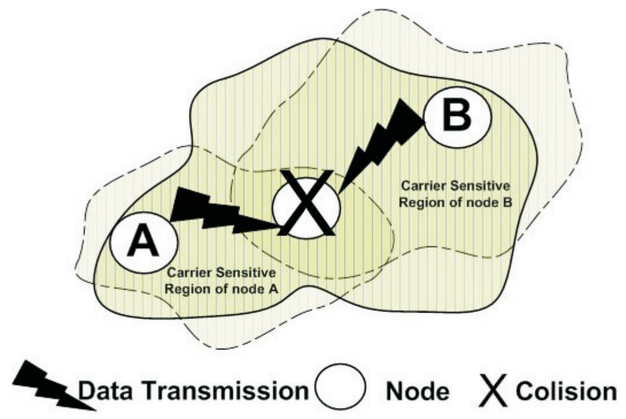
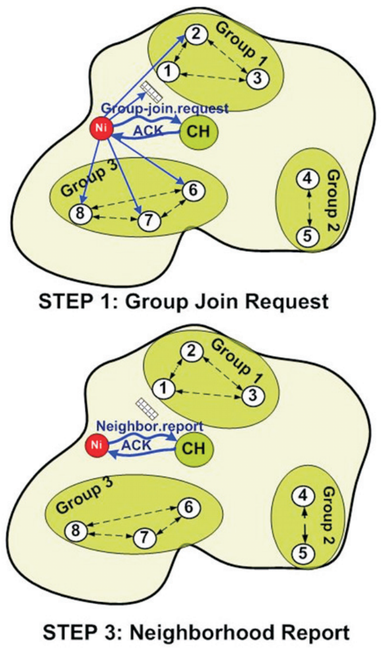
Introduction

The hidden-node problem results from factors such as limited communication range of sensor nodes, link asymmetry and the characteristics of the physical environment. It has been shown to be a major source of QoS degradation, especially in WSNs, greatly affecting: (1) Throughput; (2) Energy-efficiency; (3) Transfer delay; (4) Reliability.
No effective solutions to this problem in WSNs were proposed until now...

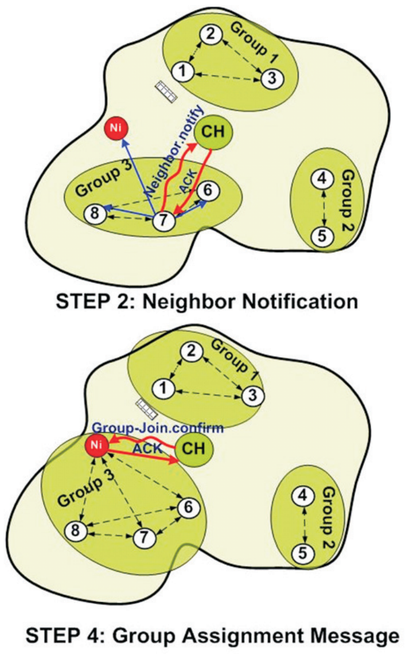


The H-NAMe Mechanism

H-NAMe is a very simple yet extremely efficient hidden-node avoidance mechanism for WSNs that enable performance improvements of up to 100%. It relies on a grouping strategy that splits each cluster of a WSN into disjoint groups of non-hidden nodes and then can scale to multiple clusters via a cluster grouping strategy that guarantees no transmission interference between overlapping clusters. Details available at http://www.open-zb.net/ (Master Thesis - Ricardo Severino)



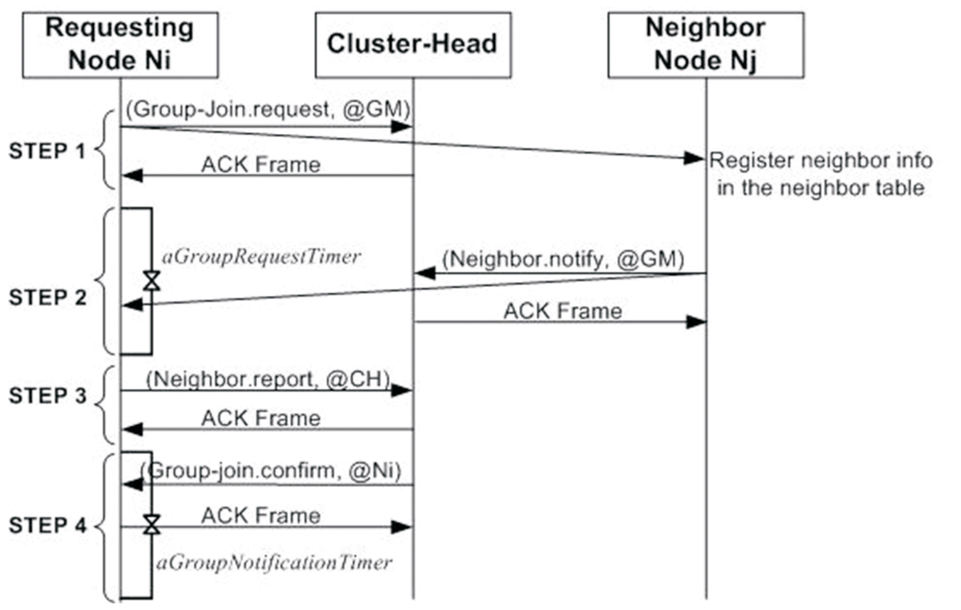
STEP 1: Group Join Request



STEP 2: Neighbor Notification

STEP 3: Neighborhood Report

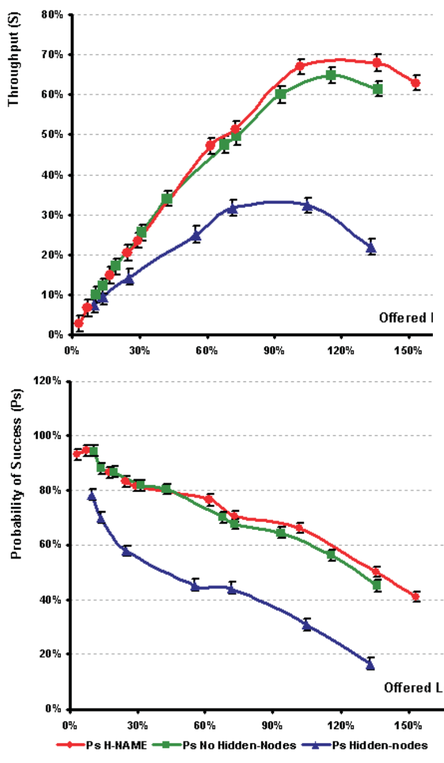
STEP 4: Group Assignment Message

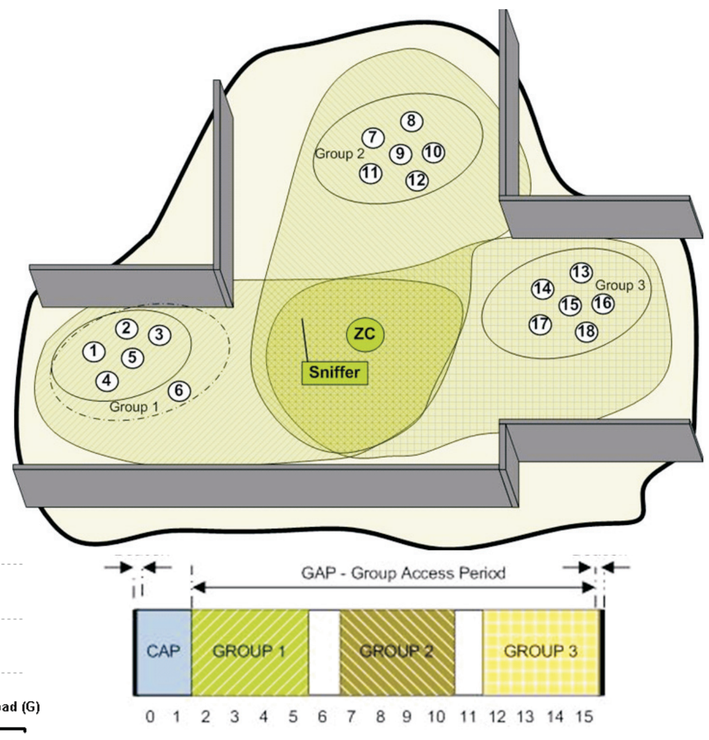


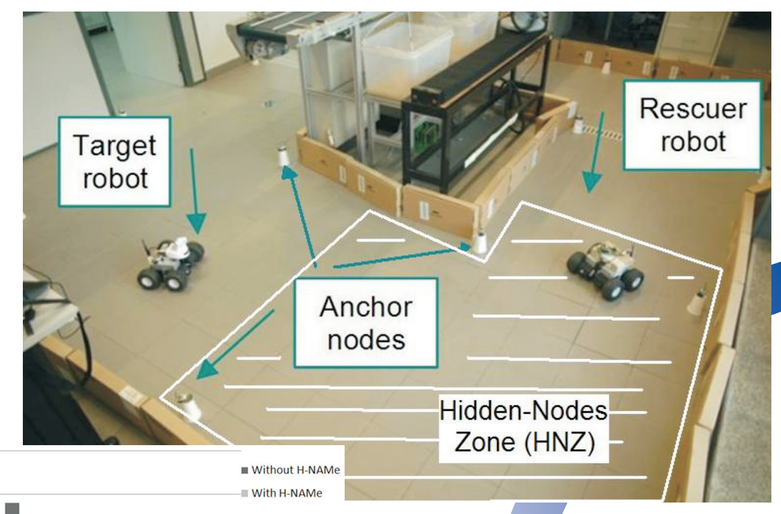
Performance Analysis

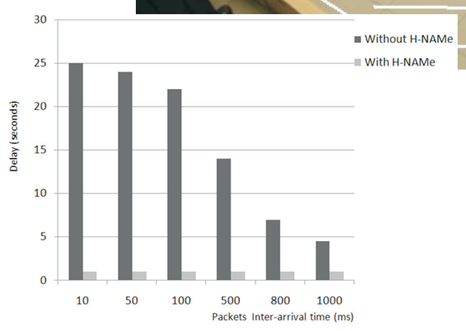
Real World Application

While it can be instantiated in other standard protocols, the H-NAMe mechanism has been applied to the IEEE 802.15.4 and implemented within the open-ZB protocol stack. Two test-beds and extensive testing and performance analysis have been carried out, showing impressive performance improvements.









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