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RPRDC: Reliable Proliferation Routing with low Duty-Cycle for Wireless Sensor Networks

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Ensuring reliable data transmission in a energy efficient way for resource constrained Wireless Sensor Networks (WSNs) is of primary concern. Traditionally, two types of re-transmission have been proposed for the data-loss, namely, End-to-End loss recovery (E2E) and per hop. In these mechanisms, lost packets are re-transmitted from a source node or an intermediate node with a low success rate. Existing proliferation routing provides QoS provisioning with low End-to-End reliability, not energy efficient and works only for transmissions from sensors to sink. This paper proposes a Reliable Proliferation Routing with low Duty Cycle [RPRDC] for WSNs that integrates three core concepts specifically, (i) reliable route finder, (ii) a randomized scattering and (iii) forwarding. Simulation results demonstrates that packet successful delivery rate can be maintained upto 93% in RPRDC with low latency, energy consumption and RPRDC protocol outperform Proliferation Routing protocol.

Keywords : End-to-End recovery, Proliferation routing, Randomized disparity, Reliability, Reliable path finder.

1. INTRODUCTION

A Wireless Sensor Network (WSNs) is a group of economical sensor nodes randomly dispersed in area. The sensor node senses the ongoing events, generates and relay packets to the destination node *via* wireless communication.The programming, re-tasking for the sensor node, command, query response from sensor nodes to sink node should be delivered reliably. Therefore, the reliability timeliness, and energy efficiency of data forwarding are crucial to ensure proper functioning of WSNs. Recent research works focuses on two categories: *i. Packet-loss avoidance and ii.Packet-loss recovery* The Packet-loss avoidance method is applied to minimize the packet loss and the Packet-loss recovery scheme is used to recover the packet loss. These mechanisms can be performed at each node or End-to-End.

Motivation: Most applications in Wireless Sensor Networks, either critical or non-critical, want data without loss from sensor nodes. It is required to design communications and networking schemes which uses limited energy resources, providing reliable data transmission and satisfying End-to-End delay of critical applications without harming the network connectivity or packet loss. In this backdrop, it is challenging to design a reliable, energy efficient routing algorithm that have low packet drop in WSNs.

Contribution: (i) The issue of reliable End-to-End routing in WSNs is addressed in this work. A novel, Reliable Proliferation Routing Protocol with low Duty-Cycle is designed to overcome the End-to-End and per hop recovery schemes. (ii) A mathematical model has been developed for energy availability, link and network reliability. Energy consumption has been reduced in sensor nodes and forwarding nodes

9. CONCLUSIONS

The combined effect of low duty-cycled sensor nodes, reduced packet re-transmission due to the high link reliability, reduced transmission/receiving/sensing of source and forwarding nodes enables the RPRDC protocol to outperform proliferation routing [1]. Further, the RPRDC protocol may be explored to achieve minimization objective with respect to sparse and heterogeneous WSNs.

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