

# ENERGY SAVING IN WIRELESS SENSOR NETWORK USING OPTIMAL SELECTIVE FORWARDING PROTOCOL

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## ABSTRACT

Energy consumption is a primary anxiety in Wireless Sensor Network (WSN). Sensor node batteries cannot be easily refilled and nodes have a finite lifetime. One of the major issues in wireless sensor networks is developing an energy-efficient routing protocol to improve the overall lifetime of the network. Several routing protocols are used in WSN for transforming the messages. In epidemic routing the messages are blindly stored and forwarded to all neighboring nodes. This may contain packet loss and energy consumption. To avoid the packet loss and to reduce energy consumption the Dynamic Source Routing (DSR) algorithm with optimal selective forwarding protocol is used. The DSR protocol is a simple and efficient routing protocol. DSR is specifically designed for Wireless sensor Network. In DSR each node (sensors) maintains a routing table. If the route is available in the table the optimal selective forwarding protocol schemes are applied. And also the forwarding schemes are designed for three different cases to improve the lifetime of sensor node batteries such as when Sensors give maximum importance for their own transmitted messages, Sensors give maximum importance for messages that arrive at sink successfully and Sensors give maximum importance for retransmitted messages to one of its neighbors.

**Keywords** Wireless sensor networking, Packet loss, Energy consumption, Dynamic Source Routing Algorithm.

## 1 INTRODUCTION

**A** Wireless sensor network (WSN) is collection of nodes organized into a cooperative network. Each node consists of processing capability, may contain multiple types of memory, have a power source, and accommodate various sensors and actuators. A

wireless sensor network consists of a large number of distributed nodes with sensing, data processing, and communication capabilities. Those nodes are self-organized into a multi-hop wireless network and collaborate to accomplish a common task [1]. As sensor nodes are usually battery-powered, and they should be able to operate without attendance for a relatively long period of time, energy efficiency is of

critical importance in the design of wireless sensor networks.

A WSN is a collection of embedded sensor nodes with wireless networking capabilities. Collectively the sensor nodes establish a wireless network for transferring, processing and monitoring the sensed data. In order to ensure a small form factor, the sensor nodes are highly integrated and provide minor processing capabilities and limited memory. More stringent, the battery-powered nodes have to carefully orchestrate the power-hungry radio device if a yearlong independent operation is targeted. To make matters even worse, wireless communication is inherently unreliable and limited in range. Altogether this makes it a very demanding task to ensure a reliable, timely and energy efficient transport of the sensed data over possibly multiple hops.

## **2 EXISTING SYSTEM**

Energy consumption is a primary concern in Wireless Sensor Networks (WSN). This is because in many practical scenarios, sensor node batteries cannot be (easily) refilled, and nodes have a finite lifetime [4]. In sensor networking communication processes are typically among the most energy-expensive. One of the major issues in wireless sensor networks is developing an energy-efficient routing protocol to improve the overall lifetime of the network. Several routing protocols are used in WSN for transforming the messages[2]. According to the concept of epidemic routing protocol, the paths are established to all the nodes in the network and the messages are blindly stored and forwarded to all neighboring nodes and generating a flood of messages [2].

The drawback of epidemic dissemination lies in the very high number of messages that are needed to obtain a successful delivery to the right recipient. Despite the fact that a proper design of the physical layer can contribute to reduce communication costs in WSN, energy savings can also be obtained by taking a higher level approach and considering the different nature of the information that nodes have to transmit. In this way, a selective forwarding scheme [6] allows nodes to keep the capacity for managing their own resources at the same time that optimizes communication expenses by only transmitting the most relevant messages.

## **3 PROPOSED SYSTEM**

In order to enlarge the network lifetime and optimize the overall network performance, sensor nodes could weigh up the potential benefits of transmitting information and the cost of the subsequent communication process. A sensors will take into account factors such as the energy consumed during the different node states, the available battery, the importance of the received message, the statistical distribution of such importance, or the behavior of their neighbors. The main idea is to avoid the packet loss and also to reduce energy consumption using optimal selective rebroadcast (or) forwarding lost packet by applying Dynamic Source Routing (DSR) algorithm. The Dynamic Source Routing protocol (DSR) is a simple and efficient routing protocol designed specifically for use in wireless sensor network [7]. Each sensor maintains the routing table and only if the route is available then the optimal selective forwarding scheme is applied.

This scheme depends on parameters such as the available battery at the node, the energy cost of retransmitting a message, or the importance/preference of the messages. A Knowledge of selective communication consist of disposing low importance messages in order to save energy that can be used to transmit more important messages in the future. Three different cases are designed for apply the forwarding schemes:

- Sensors give maximum importance for their own transmitted messages.
- Sensors give maximum importance for messages that arrive at sink successfully.
- Sensors give maximum importance for retransmitted messages to one of its neighbors.

Advantages of optimal selective forwarding technique are, the packet loss is avoided, the energy consumption is reduced and the network life time is improved.

#### **4 RESULTS AND DISSCUSIONS**

The sampling region is scheduled into number of bands using band based technique. In band-based approach there may not always be a next-hop node located in the same band, or lower band, and this will stop the propagation of sensor-data packets. In this situation, this condition is disallowed in particular sensor node. It will forwarded to out of the sampling region, each sensor node maintain the routing table. If route is available forwarded the packets to neighbor node; otherwise the node does not forward the packets. In this way Band based optimal

selective forwarding algorithm and Dynamic Source which can reduce the packet loss and also reduce energy consumption.

The Optimal Selective Forwarding protocol (OSFP) is a simple and efficient routing protocol designed specifically for use in wireless sensor networks. OSPF allows the network to be completely self-organizing and self-configuring, without the need for any existing network infrastructure or administration. The protocol is composed of the two mechanisms of Route Discovery and Route Maintenance, which work together to allow nodes to discover and maintain source routes to arbitrary destinations in the network. The use of source routing allows packet routing to be trivially loop-free, avoids the need for up-to-date routing information in the intermediate nodes through which packets are forwarded, and allows nodes forwarding. All aspects of the protocol operate entirely on-demand, allowing the routing packet overhead of OSFP to scale automatically to only that needed to react to changes in the routes currently in use.

In summary, the behavior of selective sensor networks are energy-efficient compared with the non-selective one(epidemic routing protocol), allowing the formers to obtain a huge increase in network lifetime at the same time that maximizes the communication efficacy up to the sink node, and therefore, notably improves the global performance.

**Fig. 4.2 Nodes vs. Collision Rate**

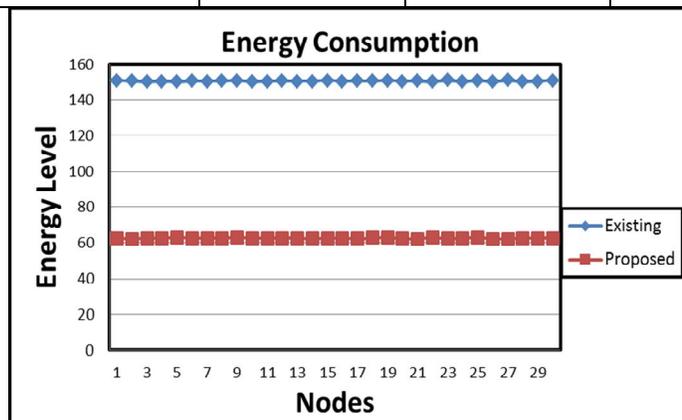
Factors	Existing	Proposed
Energy consumption (mw/ hr.)	150-160	60-65
Collision rate (s)	1000-5000	100-150
End-end delay (s)	1.0762-2.0079	0.0050-0.0200
Throughput (b/s)	100-500	2000-3000

**4.1 Average comparison of results**

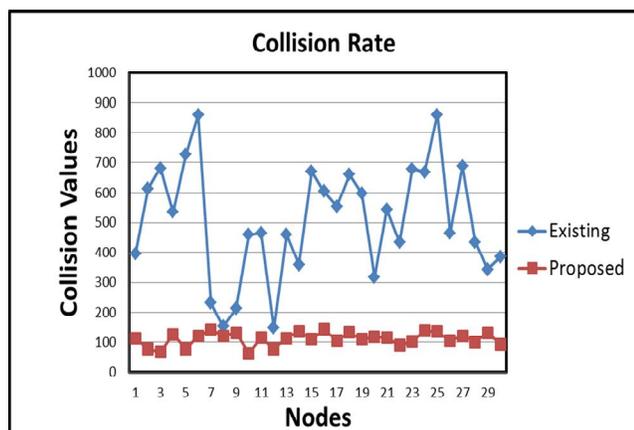
The following are the factors that are compared by the proposed work, while comparing to the existing work.

**CONCLUSION**

The selective forwarding problem derives a theoretically optimal forwarding policy that maximizes (statistically) the sum of the importance values of all messages transmitted by a node that are also forwarded by its neighbors. Our simulation work shows that selective transmission strategies based on our model can significantly improve the overall network performance measured as the sum of the importance values arriving at the sink node. This also means that the number of highest priority messages arriving to the sink node is higher than that of a non-selective forwarding scheme. It is based on the assumption that idle energy is negligible and so has disregarded the energy consumption due to this node state. As know that it is a feeble supposition since it is sometimes comparable to reception consumption, future work also includes the study of the selective forwarding schemes when idle state is considered. It may affect node decisions and therefore, global performance in a sensor network. So as future work,



**Fig. 4.1 Nodes vs. Energy Consumption**



present the design, implementation, and evaluation of the Adaptive Routing protocol for delay-tolerant unicast communication in intermittently connected sensor networks. In the evaluation of protocol, the performance is compared with regard to the following metrics.

- 1) Message delivery ability
- 2) Message delivery delay
- 3) Message exchanges

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