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NOVEL ENERGY EFFICIENT ELECTION BASED ROUTING ALGORITHM FOR WIRELESS SENSOR NETWORK

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Abstract

In WSN Sensor node closer to the sink will exhaust their limited energy more rapidly than other sensor nodes, since they will have to forward huge data during multi hop transmission to the base station. Therefore network lifetime will be reduced because of hotspot problem. Important research issue is how to cope up with network lifetime. In this paper, a modified Election based Protocol is proposed, the decision of selecting cluster heads by the sink is based on the associated additional energy and residual energy and node location at each node. Besides, the cluster head also selects the shortest path to reach the sink with the use of the congested link. Simulation results show that our approach enhanced the performance than traditional routing algorithms, such as LEACH.

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Keywords **Wireless Sensor Networks, Multipath Routing, Packet Loss, Life time, Clustering.**

I. Introduction

A. *Detail Problem Definition*

Many wireless sensor networks (WSNs) are deployed at the environment where the energy replenishment is very difficult but it is not impossible. In WSN there are limited resources which are not only used to satisfy QoS requirement but also they must be useful to increase system lifetime with minimum energy consumption. So our aim is to solve the problem of trade-off between energy consumption vs. QoS requirement to

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provide reliability gain with the goal to maximize the WSN system lifetime. It is considered that clustering is one of the best solutions to achieve the scalability, reliability and energy conservation in wireless sensor network. If the homogeneous network is consider then the cluster head (CH) is selected among all nodes which rotate in the network. Some of the protocol like HEED [2] is used to elect cluster head among all available nodes in the network, which useful for lifetime maximization. Recent studies as given in [3][4] suggest that use of heterogeneous nodes can also enhance performance in better way and prolong the system lifetime in WSN. The nodes with highest resources like highest residual energy will perform the role of CH and they are useful to perform computationally intensive task.

A routing protocol is required when a source node cannot send its packets directly to its destination node but has to rely on the assistance of intermediate nodes to forward these packets on its behalf. Since a network is characterized by its limited wireless channel bandwidth, it would be beneficial if the amount of data transmitted to the sink can be reduced. To achieve this goal, a local collaboration between the sensors in a cluster is required in order to reduce bandwidth demands. As the need for efficient use of WSNs on large regions increased in the last decade dramatically, more specific clustering protocols were developed to meet the additional requirements (increased network lifetime, reduced and evenly distributed energy consumption, scalability, etc.). The most significant and widely used representatives of these focused on WSN clustering protocols (LEACH, EEHC, and HEED) [5][6].They are all probabilistic in nature and their main objective was to reduce the energy consumption and prolong the network lifetime.

Clustering has characteristics such as scalable, energy-efficient, lower latency, etc. which make it a popular technique for WSNs. The idea is to select a set of cluster heads from the set of nodes in the network, and then cluster the remaining nodes with these heads [7][8]. The data gathered are transmitted through cluster heads to remote base stations or sink nodes. However, sink nodes are always fixed which could result in the neighbouring nodes to dying much faster and causing network partition as well as isolated sensors. A typically clustered sensor network is illustrated in fig.1

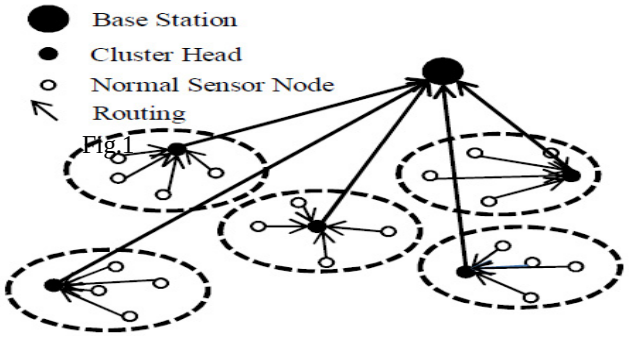

Fig.1. Cluster structure

In this paper, we propose a modified Election based Protocol (MEP), which employs the decision of selecting cluster heads by the sink is based on the associated additional energy and residual energy at each node In this modified algorithm, the cluster head selects the shortest path to reach the sink between the direct approach and the indirect approach with the use of the congested link.

The rest of the paper is organized as follows: Section 2 describes some related work, and our system model is provided in Section 3. In Section 4, our proposed MEP algorithm is explained in detail. Section 5 presents extensive simulation results and analysis. Section 6 gives a discussion of our work and finally Section 7 concludes this paper.

B. *Need of Proposed System*

The problem we are addressing in this paper is effective energy management of a clustered WSN to maximize system lifetime operation in the presence of unreliable nodes which are responsible for packet loss. We are addressing the trade-off issue between energy consumption and QoS requirement to gain in reliability and timeliness so that we can maximize the lifetime of a clustered WSN, it will also be a satisfying application for