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A REVIEW ON ENERGY EFFICIENT ROUTING PROTOCOL FOR WIRELESS SENSOR NETWORK

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ABSTRACT: Sensors are regarded as significant components of electronic devices. In most applications of wireless sensor networks (WSNs), important and critical information must be delivered to the sink in a multi-hop and energy-efficient manner. In as much as the energy of sensor nodes is limited, prolonging network lifetime in WSNs is considered to be a critical issue. In order to extend the network lifetime, researchers should consider energy consumption in routing protocols of WSNs. In this paper, a new energy-efficient routing protocol (EERP) has been proposed for WSNs using A-star algorithm. The proposed routing scheme improves the network lifetime by forwarding data packets via the optimal shortest path. The optimal path can be discovered with regard to the maximum residual energy of the next hop sensor node, high link quality, buffer occupancy and minimum hop counts indicate that the proposed scheme improves network lifetime.

KEYWORDS: wireless sensor networks, energy-efficient, data packets, shortest path, high link quality

I. INTRODUCTION

Heterogeneous Wireless Sensor Networks (HWSN), consisting of many different energy nodes, has become an important focus of research and development. Sensor nodes are dedicated to sensing environmental events and physical conditions such as floods, fires, and earthquakes. The node compresses the perceived information into data packets, which are sent to the base station (BS) Most of the node's energy is consumed in data transmission. However, as the battery of the nodes is difficult to change after nodes are deployed to the environment, their energy is limited. This paper mainly discusses the energy heterogeneity of the sensor nodes that have varying levels of energy resources in HWSN. The stable Election Protocol (TSEP) algorithm [6] is also one of typical Heterogeneous Wireless Sensor Networks. It is supposed that the network contains three different types of sensor nodes that are normal node, advance node, and super node. The normal node has the lowest initial energy. The super node has the highest initial energy. The initial energy of the advanced node is between that of the normal node and super node. It proposed three optimal probability formulas that nodes will be elected as cluster heads without considering the residual energy of the node. For the same type of sensor nodes, although they have different residual energy, they have the same probability to be selected as cluster heads. Therefore, if nodes that have been elected as cluster heads have little residual energy, which will affect the efficiency of the network due to its early death.

II. WSN ROUTING PROTOCOLS

On the basis of above mentioned criteria's WSN have been classified in various formats for their respective routing technology or methods .e.g. flat-based routing, hierarchical-based routing, and location-based routing depending on the network architecture. In flat-based routing, all nodes are assigned same work or functionality. In hierarchical-based routing, however, nodes will perform different duties; where as in location-based routing, sensor nodes' positions are exploited. If node parameters can be upgraded as per the routing

conditions and energy level then it is called adaptive routing protocol. Furthermore, these protocols can be classified into multipart-based, query-based, negotiation-based, Qos-based, or routing techniques depending on the protocol operation. In addition routing protocols can be classified into three categories, namely, proactive, reactive, and hybrid protocols depending on how the source sends a route to the destination. All routes are computed before they are really needed in case of proactive routing, while in reactive protocols, routes are computed on demand. Hybrid protocols use a combination of these two ideas. When sensor nodes are static, it is preferable to have table driven routing protocols [4]. All In [3] survey on WSN is presented, It classifies the routing techniques based on network structure: flat, hierarchical and location based routing protocols. The [4] discusses few routing protocol for sensor networks and classifies them into data-centric, hierarchical and location based. In [5] authors provide a symmetrical investigation of current state of the art algorithms. Paper [6] presents a top down approach of several application and reviews on various aspects of SN. It describes the 10 plus MAC but did not provide details of algorithms. This paper does not explain the energy efficient routing protocols developed on WSN. Our survey is focused on the energy efficient routing protocols in WSNs where we discuss the strength and weakness of various algorithm and it is comparison with Ultra Stable Election Protocol. [1] The USEP has outperformed many other algorithms in specific conditions like under high throughput and longer life span of communication cycle.

A. Luigi Coppolino, Salvatore D'Antonio, Alessia Garofalo, Luigi Romano, "Applying Data Mining Techniques to Intrusion Detection in Wireless Sensor Networks" proposed a hybrid, lightweight, distributed Intrusion Detection System (IDS) for wireless sensor networks. This IDS uses both misuse-based and anomaly-based detection techniques. It is composed of a Central Agent, which performs highly accurate intrusion detection by using data mining techniques, and a number of Local Agents running lighter anomaly-based detection techniques on the motes. Decision trees have been adopted as classification algorithm in the detection process of the Central Agent and their behaviour has been analysed in selected attacks scenarios. The accuracy of the proposed IDS has been measured and validated through an extensive experimental campaign.

B. K. Parameswari, M. Mohamed Raseen, "Aggregating Secure Data in Wireless Sensor Networks", International Conference on Current Trends in Engineering and Technology proposed to develop an energy efficient secured data aggregation protocol for wireless sensor networks, which will alleviate the node misbehaviour in the wireless sensor networks. The protocol involves mechanism for energy efficient aggregator selection. This protocol can be constructed on top of the pre-existing key distribution and encryption schemes in the wireless sensor networks.

C. Tyagi, S., Gupta, S.K., Tanwar, S., Kumar, N., "EHE-LEACH: Enhanced heterogeneous LEACH protocol for lifetime enhancement of wireless SNs" focused an Enhanced Heterogeneous LEACH (EHE-LEACH) Protocol for Lifetime Enhancement of Sensor Networks. A preset distance based threshold is used for the bifurcation of direct communication and cluster based communication in the planned scheme. WSNs near to the BS are in touch straight and those which are distant from the Base use group based communication. To assess the act of the proposed system two key parameters known as: Half Nodes Alive (HNA) and Last Node Alive (LNA) were selected. The distance based selection of threshold with the ratio of 1:9 between direct communication and cluster based communication it has been observed that EHE-LEACH has better network lifetime with respect to various parameters in comparison to the other well-known proposals such as LEACH and SEP.

D. Chand, K.K., Bharati, P.V., Ramanjaneyulu, B.S., "Optimized Energy Efficient Routing Protocol for life-time improvement in Wireless Sensor Networks" investigated Optimized Energy Efficient Routing Protocol for lifetime improvement in Wireless Sensor Networks. This research work presents a new routing protocol named Optimized Energy Efficient Routing Protocol (OEERP) that improve the lifetime of WSN. It is a cluster based protocol in which the node that acts as cluster-head is changed in each time period. This way enhances the lifetime of the WSN for two reasons primarily. The first cause is the consistent battery drain of the nodes and the second reason is that no node depends on beacon-based transmissions for long time to reach the contact point. Data sensing and

performing data aggregation are also carried out in such a way to reduce the number of transmitted messages to the entrance point. This procedure can be used for any sporadic monitoring application using WSN.

III. GROUP COMMUNICATION

The energy efficiency of cooperative communication has recently been investigated. The authors investigated the energy issues in a clustered sensor network, where sensors collaborate on signal transmission and/or reception in a deterministic way. It is shown that, if the long haul transmission distance (between clusters) is large enough, cooperative communications can dramatically reduce the total energy consumption still when all the association overhead is considered. Based on the authors in combine the cooperative communication scheme with a cross-layer design framework for multi-hop clustered sensor networks. The system is optimized to improve the overall energy efficiency and to reduce the network delay.

In this paper cooperative communication for clustered sensor networks has also been investigated. In the authors analyse distributed space-time block coding (STBC)-based cooperative communication for multitier clustered wireless sensor networks. Based on their analysis on the SER and throughput performance demonstration that cooperative communication is greatly more energy proficient than direct communication. Conversely, the number of cooperative nodes in each cluster is fixed, and the inherent circuit energy consumption of wireless transceivers is ignored, which has recently been reported to be important for low-power wireless sensor networks. In this paper we uses group communication and election algorithm to make the network energy efficient and form secure network for data transmission.

IV. CONCLUSION

The basic requirement for the wireless communication, secure and energy efficient network is the primary requirement which can be influence by different malicious node while the sensor node has limited energy constraints to transmit the packets. In this paper we proposed group communication method using election/bully algorithm to lessen the consumption ratio of nodes energy. The comparison of proposed algorithm is done with the existing methodology among different measuring parameter such as packet delivery ratio, throughput, end-to-end delay; routing load and the packet information of each node. After simulating an algorithm, the simulation result proves that method is more dexterous than the existing method. But, it has some limitation as we increase the load packet dropping also increases and hence, in future work designs such algorithm which can greatly reduce the packet drop.

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