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Efficient Evaluation of Trusted Nodes in Wireless Sensor Networks

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ABSTRACT

Wireless Sensor Networks fully relies on batteries and hence the main challenge in wireless sensor network is energy consumption. Plenty of research has been carried out in this domain but still an efficient mechanism has not been derived so far to ensure quality in service in terms of throughput. Leech protocol is the basic protocol which delivers minimum assurance in quality using cluster based concept. In this paper we have proposed a mechanism to efficiently identify nodes within range with three key parameters and select it as cluster head until it reaches it AI Thresh hold value. Further the proposed mechanism helps in resulting a improved reduction in energy consumption of nodes in wireless sensor networks.

1. INTRODUCTION

In Wireless sensor networks (WSNs), the main source of lifetime for the hubs is the battery. Communicating with different hubs or sensing activities expends a great amount of energy in preparing the information and transmitting the gathered information to the sink. As several cases, it is undesirable to supplant the batteries that are draining or depleted of energy. Numerous scientists are in this field attempting to discover power-aware protocols for wireless sensor networks, keeping in mind the end goal to overcome such energy effectiveness issues but they have their own assumptions. For the optimization of WSN designs, researchers have proposed various approaches. To meet different design criteria, related researches into the optimization of wireless sensor network design can be grouped into three categories: 1) Optimization in the communication layers; 2) Node hardware optimization and 3) Cross-layer optimization. However, most of the optimization procedures do not take into account the principles, characteristics and requirements of WSN which is application defined. In existing approach energy optimization is done using hybrid algorithms i.e. GA and BFO method in DSR protocol. Within the application layer, the traffic load is usually squeezed to scale back the data size. Various algorithms such as in-network data processing is actually produced to scale back energy consumption when compared to transmitting the raw data towards end node. The routing layer as well as MAC layer is usually optimized by simply choosing appropriate. Protocols to gain productivity. Node optimization can be achieved by simply strengthening battery utilization as well as implementing power-aware equipment layout.

2. LITERATURE SURVEY

It has been observed that proposed method outperforms than OD-PRRP, LEACH, DSR, PEGASIS and PDORP-LC while considering bit error rate, end to end transmission delay and energy consumption metrics with varying number of nodes. In case of throughput metric LEACH is better than all other candidate routing protocols, on the other hand LEACH is unsuitable for the applications where energy consumption is a key constraint. The energy consumption of proposed algorithm is almost stable even with the increase in number of rounds and nodes are in highly dynamic location in nature. In terms of energy consumption parameter PDORP-LC will act as optimal routing protocol. In addition, results show that proposed routing protocol PDORP-LC

marginally outperforms than LEACH, DSR, and PEGASIS and even from ODPRRP while considering low packet delivery delay.

3. SYSTEM MODEL

End to End Transmission Delay:

This parameter signifies the total amount of time taken by a packet from source to destination including transmission delay, queuing delay, propagation delay and processing delay. However an increase in the numbers of nodes also increases the difference of delay. The delay in transmission of a data packet is the amount of time between sending data packet by source node and receipt of same at the destination node demonstrates the results for end-to-end delay with varying number of sensor nodes[7,8]. It has been observed that end to end delay for OD-PRRP increases with increase in the number of nodes. In addition, results show that proposed routing protocol PDORP-LC marginally outperforms than PDORP while considering low packet delivery in dynamic environment.

Bit Error Rate:

The metric defines the measure of the number of errors found in the network during packets sending. It has been seen that value of error rates has been enhanced in the attack clearly shows that DSR protocol has a less error rate as compared to the entire candidate routing protocols. Moreover the proposed algorithm PDORP-LC performs better than PDORP and sometimes from LEACH as well. When a node becomes more aggressive at the time of transfer and previously it was not in the cache memory, the other node is bound to receive a packet from it and in such a way it can cause damage to existing routes[7]. So the proposed solution creates trusties for the first time in each round on the basis of the parameters allocated to the nodes which results in less chance of attack and less bit error rate even in the state of dynamic WSN nodes.

Energy Consumption:

This generates lowering of the number of transmissions for the forwarded messages to all the group members. It is defined as the sum of units required for the key transmission throughout the duration of the simulation[1,2]. The energy consumption formula for transmitting the data is:

$$ETx\ (k, d) = Eelec * k + Camp * k * d2,\ d > 1$$

Energy consumption formula of receiving data: $ERx\ (k) = Eelec * k$ Where k is the data volume to be transmitted, d is the distance among the two sensors. $Eelec$ is the energy consumption to take out the data transmission in terms of nJ /bit. Therefore, the total energy consumed =$\Sigma\ ERx + \Sigma\ ETx$, i.e. the total consumed energy of data receiving + total consumed energy of data transmitting[3]. From the below It has been observed that PRP and new routing protocol PDORP outperforms than DSR, LEECH and OD-PRRP. The energy consumption of proposed algorithm is almost stable even with increase in number of nodes. In terms of energy consumption parameter PDORP will act as optimal routing protocol.

Throughput

This metric describes the average rate of successful messages delivered over the network in a given time. LEACH protocol is better than all other candidate algorithms. DSR is also better than PRP, PDORP and OD-PRRP protocols[4,5]. It is clearly indicated by the results that LEACH outperforms in throughput oriented applications. The performance of PRP, PORP and OD-PRRP is almost similar in case of throughput.

4. SYSTEM IMPLEMENTATION

The experimental evaluation is done to prove the efficiency of the proposed system is equal even the nodes or in highly dynamic in nature. The new method is compared with the existing method in Delay, Energy consumption and Throughput parameter.

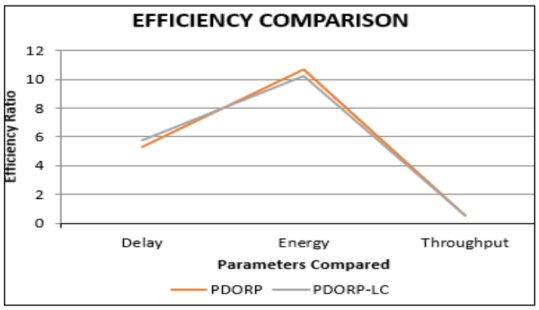

Figure 1 Efficiency Comparison

The below comparison table is used for efficiency comparison between parameters delay, energy and throughput for 200 nodes.

Parameters	Delay	Energy	Throughput
PDORP	5.287	10.66	0.509
PDORP-LC	5.8	10.25	0.51

5. CONCLUSION

In this system an optimized routing protocol (PDORP) along with local caching (LC) is presented, which uses cache and directional transmission concept of both proactive and reactive routing protocols in a dynamic WSN environment. The performance of PDORP-LC has been evaluated by comparing with existing available methods PDORP and the results indicated that it performs better in most significant parameters viz Bit error rate, end to end transmission delay, energy consumption and throughput. The proposed work is performing in dynamic environment with the dynamic derivation of trusted nodes.

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