Energy Aware Routing In Wireless Sensor Network: A Survey

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Abstract:-Wireless sensor network contain different architecture and algorithms [1], considering different network topologies, results demonstrate that the proposed resource allocation and flow selection algorithms provide notable performance gains with small optimality gaps at a low computational cost. Now, whether the WSNs are starting to become a reality in this world, but there are some limitations such as change in topology randomly, restrictions in power, limited computational resources like power, error-prone medium, energy efficiency. Now-a-days, most of researchers are using their skills mostly on designing issue of energy awareness routing approaches. Thus, energy consumption is an important limitation of WSN which demands researcher's skills to get a way in reducing the energy consumptions by sensor nodes used in WSN. In this paper, survey is done on different routing protocols based on clustering used for wireless sensor networks along with comparison and advantages and disadvantages of them.

Keywords: energy aware routing, WSN, DTN, energy aware routing.

I. INTRODUCTION

Todays in the market of rapid growth of computers the processing power are increased unexpectedly but the price and size of computers have greatly reduced which encourages the use of computers very much.

The latest technologies have made vast advancements in computers era and also enhance the use of computers in our daily activities. In recent years, from the economic point of view, the single-purpose desktop computers having sensors embedded in them are highly used due to cheapness in prices and reduction in size of computers. Wireless Sensor Network is a recently increasing in demand by all people involving in many because of applications their substantial applicability to improve our lives. They aid us by extending our ability to accurately monitor, study, and control objects and environments of various scales and conditions such as human bodies, geological surveys, habitats, and security surveillance. Large no. of sensor nodes in a sensor field are used to transmit information about events to satellite associated through Sink node.

In single path routing, the presence of a malicious node on the path can manipulate and corrupt the data without catching the attention of the sink node. Multipath routing is an alternative routing technique, which selects multiple paths to deliver data from source to destination. Because of the nature of multipath routing that uses redundant paths, multipath routing can largely address the reliability, security and load balancing issues of single path routing protocols.[2] Thus, multipath routing plays an important role in WSNs and many multipath routing protocols have been proposed in the literary of WSNs research. In this paper, we take an initial step to summarize all multipath routing techniques proposed in the WSN research literary. On the basis of the protocol feature and its speciation we classify existing multipath routing techniques.

There are three categories:

- A) Infrastructure Based.
- B) Non-Infrastructure based.
- C) Coding Based.

II. LITERATURE REVIEW

Infrastructure Based Multipath Routing Protocol [3]

The most important features of the infrastructure based multipath routing protocol is the construction and maintenance of multiple paths from source to destination [8]. Any specific topology structure can help to build an efficient route from source to destination. For example, in a spanning tree, in which the WSN is considered to be organized into a tree and the sink node acts as a root of that tree, multiple paths are discovered by traversing the tree. To design an infrastructure not based on a specific topology structure, protocols use message broadcasting which helps them to collect information about their neighbours. Each node stores a list of capable neighbours which can efficiently transfer the data.

In another paper authors propose a multipath routing protocol named Reliable and Energy Efficient multipath routing protocol (REEM) which constructs multiple paths from source to destination, considering node reliability and energy level. The path is constructed by a base station through message broadcasting and each receiving node will store the neighbouring information in a table. Also, the path reliability is evaluated by the base station through a weighted and oriented graph, based on the neighbour information. It is more challenging to be energy-efficient in large scale WSNs [10]. Therefore the authors in propose a novel protocol named Multipath Routing in large scale sensor networks with Multiple sink nodes (MRMS) to save energy. The main idea is to deploy multiple sink nodes and uses path cost metric to select the multiple paths. The path cost metric is denied based on the distance between two neighbour, hop count and available energy at the node.

Ant Based Algorithm [11]

Ant based algorithm is another infrastructure based approach which is used to build multiple paths. The algorithm is a population-based Meta heuristic approach inspired from behaviour of real ants. The main idea behind this theory comes from observing the ability of ants to and the shortest path between the food source and the nest. Here is a brief example explaining the basics of this algorithm. An ant named 'xixi' roams independently in search of food. Once food is found, 'xixi' comes back directly to the nest leaving a trail of pheromones along the pathway. The rest of the ants follow the pheromone trail and use the same path to get to the food. On the basis of the working of the above algorithm two types of algorithms, Ant Net algorithm and Ant-based control algorithm have been developed. In Ant Net algorithm both forward ant and backward ant work together to grab the network information.

The author [13] proposed a paper titled "Leader Selection in Wireless Sensor Networks an Energy Efficient Approach" in which they have stated that various limited energy of the wireless sensor node is always arise an issue in the routing protocol with energy efficiency and they proposed that a leader selection algorithm for these routing protocols to enhance the network lifetime to a greater extent. Distance of the node from base station, degree of connectivity of the node and trust level of the node is individually analyzed and is linearly combined with weights associated with each parameter. This gives the overall potential function of a node to become a leader. The number of rounds after which leader selection takes place is also equated. Through simulation the algorithm is compared with traditional energy-distance based method for routing protocols LBEERA, OREC, PEGASIS and SHORT. Significant improvement of network lifetime is obtained using this leader selection algorithm. Highest improvement of more than 8% increase in network lifetime is observed when distance of the node from the base station is given a higher linear combination weight.

In [2] they have proposed a paper on working with energy routing protocol "Multi-Metric Energy Efficient Routing in Mobile Ad-Hoc Networks" in this paper they have taken into consideration multiple layer parameters, such as MAC queue utilization, node degree and residual energy. They integrate multi-metric routing scheme into OLSR, a standard MANET proactive routing protocol. The main observations are that in static and low mobility scenarios our modified routing protocol leads to a significant increase (5% -20%) in network lifetime compared to standard OLSR and slightly better performance in terms of Packet Delivery Ratio (PDR).

In [14] an enhanced multiple mobile sink based technique to reduce energy consumption in wireless sensor networks, is presented. In wireless sensor network mobile sinks are used to reduce the energy consumption. But single mobile sink is not sufficient to do that task because it generates interference in the network and performance degrades. Thus a multiple mobile sink based technique provides enhanced framework to deal with such issues.

In [15] a mobile sink based technique is presented which used to prevent energy consumption in wireless sensor network. In that technique a cluster with cluster head is used. On the occurrence of any event that mobile sink moves towards the cluster head. That cluster head used to collect data from the sensor node. Once data is collected by the cluster head, then that cluster head inform the mobile sink about the data. Then mobile sink collect that data and store it. That way that technique increases the life of the network.

In [16] a mobile sink energy algorithm is presented, which used to reduce energy consumption in the mobile sensor network. Energy consumption and mobility are biggest problem in wireless sensor network. Technique is required to deal with such issues. A mobile sink based technique is presented which used to deal with that problem. In that technique a mobile sink is used to reduce the load of the nodes in the wireless sensor network. A mobile sink energy consumption algorithm is used which provide effective management to deal with such issues.

Limitation of WSN:

Whether the WSNs are starting to become a reality in this world, but there are some limitations such as change in topology randomly, restrictions in power, limited computational resources like power, errorprone medium, energy efficiency.

Algorithm or	Description	Advantage	Disadvantage
approach			
Ant Based Approach	A real ant's behavior of finding path from the different routes. A significant pheromone trail use for finding the path for other ants.	Two way path traversing is possible. All the other node no need to find path separately.	Once the path is broken or disturbed, it needs to reconfigure the complete path. Does not imply different topology, if required.
Hierarchical Approach.	A Hierarchical based approach of finding path from the existing parent path.	It is appropriate for a large scale network because the communication overhead can be significantly reduced due to the hierarchy. Hierarchal protocols construct node disjoint paths to avoid collision.	Heavy workload process may deplete the lifetime, as number of process increase while following the approach.
IP-based scheme	Single and multiple paths routing IP based scheme is applied in order to transform the packet.	Single path routing is simple and scalable; It is simple because the route between the source node and the destination node can be established in a specific period of time. Multipath routing that uses redundant paths, multipath routing can largely address the reliability, security and load balancing issues of single path routing protocols.	It does not efficiently satisfy the requirements of resource constrained WSNs.
Tree based clustering Approach	This algorithm preserves energy by turning off radio (entering sleep mode) of either impossible or unnecessary nodes, which observe almost the same information, based on their location information to remove	The algorithm balances the energy consumption. It increase lifetime by constructing minimized spanning tree in each cluster.	Communication from one node to another node may delay sometime to approach.
Leader Selection	redundant data. Data transfer in between the different available nodes using leaders. The leader is going to transfer and deplete the energy balance is applied using the algorithm.	It increases the overall lifetime for the network. It makes utilize all the component of a node network.	Time complexity is increases as we are using some parameter which doesn't part in energy efficiency in the network.

Table:	Comparison	between	different	available	approaches
I unic.	Comparison	between	unitient	available	appi ouches

Proposed work which can be done:

In order to increase life time with packet delivery ratio we can further improve the algorithm in following way. We can further proposed a cluster based technique in heavy network where the total number of node can further attempt and defined as group which are cluster group and further a routing table can be maintain for each cluster group. As the request receives for the data transfer it can assign to the group where highest energy level is available and also it can compute the least distance from the source node and respective sink node. Thus obtaining two factor distance from the node WD and making the technique, data transfer in cluster manner can further improve network life time. As if any cluster get down it can further use another cluster for data processing. First cluster having highest energy can consider as main cluster to transfer data and thus second highest cluster with energy level can always give a backup if failure occur in one cluster . Thus an Efficient transfer in less time complexity and energy efficient can further improved.

III. CONCLUSION:

In this work we have discussed various techniques where the unreliable links in wireless sensor networks are facing the problem of data optimization with accuracy and the problem to deliver the data in various links often get the issue of link failure and hence by obtaining the centralized system where the links and their routing techniques are centralized and aim to deliver data with high precision, and the paper solve the issues associated with the complexity and we take an initial step to overview the proposed multipath routing protocols in WSNs. We classify multipath routing protocols mainly based on whether the proposed routing protocol creates multiple path infrastructures or not. Furthermore, because of the special importance of coding techniques in multipath routing, further discuss a set of coding technique based multipath routing protocols in detail.

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