

# A Survey on Energy Conservation for Mobile-Sink in WSN

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**Abstract:** Recently Wireless Sensor Networks (WSN) is one of the increasing technologies to provide a service to the network users. WSN is used to transfer the data among the network nodes. To transferring the data, network should provide better communication method among WSN and should provide efficient energy consumption. To achieve this problems many approaches like mobile sink protocol and some other strategies were developed to transfer data through mobile sink mechanisms. These approaches solved only the data transfer problem but fail in solving efficient energy consumption while routing. In this survey we analyzed how to save the energy of the each cluster nodes by selecting Multi Mobile Sink nodes (MME) in WSN. Mobile Sink is one which has a long-lasting life for transfer data to the destination in WSN. For this approach this survey shows the various researchers issues and their benefits.

**Keywords:** WSN, Multi Mobile Sink, Cluster node, Data transfer and Energy conservation.

## I. INTRODUCTION

With the improvement level of advancement technologies in Wireless network, it has to provide it in an effective data transfer mechanism to the user. A network has allowed the rapid development for wireless communications. Wireless Sensor Networks (WSNs) embrace enormous amounts of sensor nodes which make up the networks for monitoring the region of process and feed data about the targets or result of importance back to the end-users. WSN usually contains small, inexpensive and resource limited devices to communicate with each other. WSNs can be commonly used to achieve military tracking and surveillance, dangerous environment exploration, natural disaster release and health monitoring, etc. The output of the WSN is reliant on the relationship between the upper bound on the data collected and the number of members belonging to each sub sinks or sub nodes [1].

To exchanging the data, networks have to provide a better node for transferring the data between the nodes. Here better node can have an effective one to providing a service between the nodes. Here this is one of the worst factors. For transferring the data in cluster nodes, any one of the nodes have an efficient energy to transfer the data. Reducing energy consumption in WSN communications has involved increasing alertness recently. They were many techniques like distributed data networks (i.e. antennas), heterogeneous network, multi-hop networks, etc. were developed for this issue. But some techniques provide

superior result at the same time it failed in energy consumption for multiple data transfers. Recently, sink mobility has become an important research topic in WSN for energy conservation [1, 2]. The Mobile sink trajectory is random to gather information of significance sensed by the sensor nodes. Collecting effective data by consuming less energy can improve the network performance. And also fixed path node can progress the energy efficiency of single-hop but not in multi-hop and limited paths may cause communication problem to transfer the data. Energy consumption is one of the important factors in mobile sink nodes. In general, energy consumption consists of sensing, processing and transmitting the data. For transferring data we consider the energy consumption only at the communication process, because transmitting of message can take more energy than processing the message. For transferring the data an unbalanced energy problem may occurs due to reducing battery power and also some of initial energy unused. By using WSN, can share the data among sensor-to-sink paths, so they have heavier message transmit loads and also it consume more energy. The use of mobile sink protocols may provide better energy efficient data transferring mechanisms for WSN. For these issues this survey shows various energy efficient algorithms benefits and their drawbacks [2].

## II. LITERATURE REVIEW

In WSN, data gathering causes more energy consumption. Several ideas were introduced for energy conservation approaches in the wireless sensor networks. Some approaches have benefited for conserving the energy in the single-hop network, but network have to provide benefits to multi-hop networks also. The aim of this survey is to provide a comprehensive study of various researchers' approaches and their limitations for solving efficient energy conservation problems.

Xing, Guoliang, et al [3] analysis the problem of data are delivered to the base station before their deadline, hence Mobile Elements (ME) can't sense the data for transfer of the data to the Rendezvous Point (RP) i.e. next nodes and communication problem may arise. The Mobile Elements progress may experience interrupted due to mechanic problems of motion nodes. Furthermore network may endure from communication delays due to congestion or node/link failures. As a result, data may miss its deadline, or the ME and data may miss each other at RPs.

For these analyzing issues Xing, Guoliang, et al proposed a Rendezvous based approach for exploiting ME to collect the data under secular constrains. Here researchers were present two algorithms which is RP-CP and RP-UG is developed for analyzing constrained and not constrained path for data transmissions for mobile element and the Rendezvous Points. These algorithms were used to facilitate the reliable data transfer from RP to ME were this approach is used to find a set of RP that buffer data from sources and transfer them to MEs when they arrive. By this approach their simulation results shows the reduce energy consumption and well scaled network density and speedup the networks.

S.Sujitha and G.Mohan [4] studied the problem of inefficient communication, reducing the network lifetime, etc because of weighted rendezvous planning (WRP) algorithm. It achieve only for single mobile sink data transfer mechanism and it does not concentrate on multi mobile sink mechanism so they where problem may occur for the energy conservation mechanism and losses of energy due to without sharing of mobile host hence WSN are not frequently visited at any networks. And also if any interference detected in the node then it should not alternate the channel. Then losses of packet or data may occur. This problem leads to falling network lifetime, ineffective communications, etc.

For this problem S.Sujitha and G.Mohan proposed an efficient Multi-sink clustering based weighted rendezvous planning method (EE-MSWCRP), which is used to perform the multiple mobile sink nodes. It is used to consumption of energy under different networks. So we can easily consume the energy in this application. For this multi sink the coordination of the multiple users should be acclimate to make connect to every nodes in various time slots. By this approach they were used to perform this operation in different methods to solving this problem, i.e. *Node Selection Mechanism*, used to select the longtime life node for transferring the data through cluster nodes.

H.W. Rabiner et al [5] studied the problem of energy conservations in Wireless Sensor Network, this sensor network contain more data to transfer to an end user. By transmitting the data through a network they occur many problems like high energy conservation, loss of data occurred because of falling battery power problem, etc. so transfer of data may not possible under these issues.

H.W. Rabiner et al studied various approaches and proposed a classic clustering algorithm based on Low-Energy Adaptive Clustering Hierarchy (LEACH) for WSNs. It is a cluster-based protocol used for randomized rotation of local cluster heads to uniformly share the energy load between the sensors in the network. By using this LEACH, it reduces the communication energy for transmitting the data. Hence it has prolonged lifetime network and static clustering algorithms. By using this static clustering, where data are collected from parallel areas or nodes and transfer it into sink nodes, then it share the task among the nodes to reduce the overload of a single nodes in WSN. On the other hand H.W. Rabiner et al approach have some drawbacks; here no guarantee about the total no. of cluster head nodes, if one cluster node fails

means other nodes are unable to transfer the data to the next nodes and this approach is not suitable for multi-hop networks.

Rahmaan K and Narendran M [6] analyze the problem of WSN collusion problem due to the concurrent transmission of data from rendezvous node (RN). By collusion in network they were delay of transferring the data occurred. And some of data were disrupt in WSN transmission. Because of disruption some of the data may eliminate. They were losses of data occurred due to occurrence of disruption problem. And also in some case RN work out of energy hence battery power became low due to fighting with these problems.

For this above issue Rahmaan K and Narendran M proposed a MobiCluster (MC) algorithm to maximizing the connectivity for effective data transfer and enabling the network with less conservation of energy. Here data are collected from all sensor nodes for limitation of energy conservations through MC. This approach is addressed by utilizing the Mobile Sinks to collect the data from remote sensor area and extend the lifetime of RN which lie within the cluster nodes and deliver the data to the designation node. This solves the energy conservation problem, reduces communication costs and preventing the data losses.

Chen, Yuequan et al [7], studied the prolonging lifetime problem of with the increasing no .of data transfer in networks. To discovering the topology and maintaining the cluster head and switching the path are the most important one in networks. If the data are send in the primary path can dissipated at any time because it consume more energy, and if it want to re-select the path is difficult one to choose the alternative path. This can increases the energy consumption problems.

Due to this issues Chen, Yuequan et al proposed a MRMS (Multipath Routing in large scale sensor networks with Multiple Sink nodes) which is used for multiple sink nodes. It is only used for dynamic path method of selection for improving the energy efficiency problem. It distributes the energy in sensor networks to keep the energy of the nodes to improve the performance of data transfer mechanisms. By distributing the energy through node in the cluster every node have the lifetime energy by this approaches. But it failed in multipath mechanism for multi sink nodes.

### III. ACHIEVING ENERGY CONSERVATION IN MULTIPLE MOBILE SINK

WSN is one of the important one to transfer the data with the large number of sensor nodes deploy in a field. In single-hop, transfers of data are done only for small area with the limited number of nodes. But in multi-hop, transfer is risky because nodes that are near to each other so they become congested and it have the responsible for transferring the data to the end user [8, 9]. For this congested problem energy may reduce due to the congestion of the data. Reducing energy consumption and preventing the data from congested one and forward it to the end user is one of the major issues through Rendezvous Point (RP) in Multi Mobile Sink Mechanisms (MMSM). To solve energy consumption problem, network have to select the better cluster head to transfer the data by sharing

the energy between the nodes, and network provide a better communication between the cluster nodes and also select the long lasting battery for mobility nodes to transfer data among RP.

#### a. Cluster communication

Cluster communication is one of the important one among the cluster nodes. It groups the reliability for end to end nodes for message transferring and multi connection between the mobile sink (paths) [10]. Here the communication is the process of transferring the data among the nodes. Each and every node in the cluster will act as a both sender and receiver for transferring the data. In network, one node transfer the data to another node means that node is the responsible one to transfer that data to the end node. Transferring of data among the cluster network is the cluster communication [4]. Through this cluster communication the data are travelled among the node so energy of every node will be prevent by sharing the energy between the cluster networks.

#### b. Cluster head selection

Through cluster communication selection of cluster head among the cluster nodes can solve better energy consumption problem. In WSN they were n no of nodes were connected to boost the efficiency and throughput of the communication [4, 6]. Each and every node in the network is ready to transfer the data at any point of movement. Transferring of data was done through cluster nodes. In existing the transfer of data are done only in one node i.e. distribution of data were done through a single intermediate node, so they were collusion problem, energy loss were occurred and losses of data also occurred. To avoid this problem data can transfer at any node through network can solve this collusion and energy loss problem. Transfers of the data are done through selection of node in a network and choose the cluster head which have the long lasting life to transfer the data. Cluster head selection should be based on node density, bandwidth of the node, long-lasting energy, communication cost and so on. The network lifetime should be evaluated by the mobile nodes. The cluster of nodes should be elects the cluster head and the cluster head maintains the Report about the nodes in the topology, so it can reduces the energy conservation problem and every node in a cluster have an equal energy no losses of energy will occurred. The Cluster Head should be varied from hop of the nodes.

#### c. Sink Mobility Pattern using RP

Sink mobility become an important research topic in WSN. Mobile sink path is used to collect the information or data from the sensor nodes. Sink mobility task is to moving and collecting the data from every node [3]. Collecting of effective data through sink mobility can consume low energy and improve the network performances. Fixed path of sink mobility can progress the energy for single-hop network, because it have limited path to communicate and in multi-hop network they were more node which is used to transfer the data, by using fixed path in multi-hop method can solve the energy problem using shortest path finding and it is easy to choose the cluster head and consume low energy for collecting data. While transferring the data in networks data may transfer to every node which is called

Rendezvous Point (RP) [11]. RP is a subset of nodes of the Mobile Elements (ME) used to pick the data where it travelling in all the nodes. Using this mechanism source node can process and transfer the data to its nearest node i.e. RP. Then RP collect the data from more than one node until ME arrive to obtain the data. After arrival of ME, buffer size of RP will decreased so we can easily consume the energy for that nodes.

#### d. Multiple Mobile Elements

Mobile Elements (ME) is one which act like travelling across the network and fetch the data from the RP. It travel and collect the data from every RP for saving the energy of the every node in networks. By providing single ME is not fare one to obtain the data across the networks. Multiple ME can solve the time consuming problem and send the data within a deadline. In very large network MME can prevent the deadline expiration problem. Here each ME is allocated a set of Sensor Nodes. The ME collects data only from allocated set of sensor nodes. By providing this technique then the battery power will maintained for the every node in the networks [3, 12]. Providing MME in the network can improve the battery power of every sensor nodes. When the data are transmitted from the base station through multi-hop every RP must be ready to receive and send the data to the ME when it occurs near the RP, so we can transmit the data with low energy consumption.

### IV. OUTCOMES OF SURVEY

- In this survey, we have studied the energy efficient problem of various researchers' approaches in various research articles for transferring the data between the cluster nodes.
- Energy consumption for data transfer is one of the essential one in WSN to transfer the data within the deadline.
- In single-hop network, it is easiest one to transfer the data with the minimum no. of nodes but in multi-hop it difficult to transfer the data with the large no. of nodes.
- Data are transferred among the cluster nodes can communicate with each other; by selecting the cluster head in a cluster node can effectively solve the collusion, losses of data and energy problem.
- Cluster head is one which has the long lasting life to transfer the data among the nodes and maintains the report about the nodes.
- By this approaches data can send easily and energy of nodes also maintain at the same level without low battery problem and all.
- This solves the data loss problems among the networks.
- In this survey we achieve minimizing and balancing the energy consumption problem by using the MME for the RP and maximized and prolonged the lifetime of network.

### V. CONCLUSION

In this survey, we have studied various approaches for efficient energy consumption for data transfer among the cluster nodes and present an overview of energy consumption problem in WSN. With the advancement technologies of wireless network, WSN is one which is

used to propagate data among the networks. For transferring the data they were many problems occurred due to reducing battery problem. For this issues many approaches were developed, they solved only data transmission problem but failed in energy consumption among the nodes. In this survey we have presented a Multiple Mobile Sink mechanism among the cluster nodes to perform the data transfer activity through rendezvous point (RP) among the cluster. By using this we got effective energy consumption and prevent data loss problems.

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