



## Local and Global Query Based Multi-Sink Data Communication in WSN

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**Abstract-** *Wireless Sensor Networks consists of large number of sensor nodes. If a user wants to communicate with the other nodes, the user firstly communicates to the sink. Then sink communicate to the intermediate dissemination node. The node further sends the request to other IDN and so on. Hence whatever the information a user wants to know is done only via the IDN. In this communication the energy consumption is very high. Hence the battery life of the node is also less. For enhancing the energy levels in WSN nodes by saving energy using concept of multi sink scenario. We will use WiMax to communicate in between two Sink nodes to pass its data. Local query are those which is generated within the TTL (time to live) period of the data taken by any randomly selected source and placed in cache layer nearby the sink to use in future. If query generated by any source and that source is very much far away from first sink but nearby second sink then we will use the concept of global query, here second sink will take data through valid routing algorithm and will pass same data to first sink using WiMax concept and also saves data in its caching layer too for future use. Hence, energy consumption can be reduced.*

**Keywords-** WSN, IDN, WiMax, TTL, multi-sink

### I. INTRODUCTION

Wireless sensor networks (WSNs) are comprised of many small and resource constrained sensor nodes that are deployed in an environment for many applications which require unattended, long-term operations. In WSN to determine the life of the sensor network the energy consumption is the main factor. Because the sensor nodes are depends upon the battery life and the sensor nodes also has the low energy resources. Hence this is the basic reason why the energy optimization is complicated in the wireless sensor network. So this factor in WSN is involves the reduction of the energy consumption and also it increases the life of the network as much as possible. For this the energy awareness is very important in every aspect either in case of design or operation. Hence it ensures that the energy awareness is helpful in communicate sensor nodes throughout the whole network.

### II. SCENARIO RELATED TO MULTI SINKS IN WSN

Suppose in WSN there are more than one sink which creates the same query. For this situation each sink will have the different paths to reach the source node. Hence the complexity of the network is increases in this case. So for handling this problem concept of caching is used. In the WSN caching is act as a tree. Here the caching have the multiple numbers of levels where its leaf nodes are communicate with the internet nodes in the WSN. In the WSN each sink is not able to communicate directly to the source node. Hence it saves the unwanted traffic in the network and it also save the time of the communication between the various nodes. The caching has the feature to reduce the data traffic and save the energy consumption in the network. The WSN are prone to the node failure. The node failure occurs in the WSN due to the power loss in the network. To provide the reliable services throughout the network, the nodes self adjust in the network. The bottleneck node has the limited battery life so it is the basic reason of failure in the network. To overcome this kind of failure we use the network protocol. The network protocol has the many properties to handle this kind of failure in the network. Each sensor node in the WSN is relying on the battery and battery has the limited life time. If the battery time is over then the node failure is occur in the network[8]. In the WSN the node replacement is not possible due to some physical constraints. Hence if we want that WSN work properly we should save the battery lifetime. Hence the battery lifetime is extended by decrease the maximum communication among the various nodes in the network. In the WSN use caching for store the data or information in each sensor node.

### III. LITERATURE REVIEW

E. IlkerOymanet. al, discussed about the multiple sink location problem in the large scale wireless sensor network. The multiple sinks show the problems that are depending upon the design criteria. The sink nodes are locating in the sensor network. The operational time for the sensor network required is minimum. In order to maximize the lifetime of a sensor network, energy resources of each individual sensor node must be consumed. In large scale sensor networks, the network must be[18] divided into smaller sub networks. It is used not only to increase manageability of the network, but also to increase the network lifetime. They have introduced the multiple sink network design problem. The sink nodes should be calculated depending on several different design criteria. They have demonstrated a simple sink location case, where the

number of sink nodes was known before the deployment phase. They have implemented the solution for BSL problem, and presented the corresponding energy and disconnected region maps on a sample sensor network for different snapshots in time. They observed that how the disconnected region increases with time. They encountered with failures at the sensor nodes that are close to the sink nodes, because these nodes have served a larger branch set. However, not every sensor node that is close to sink nodes fail early, since these nodes have a very small number of sensor nodes to serve. To reconstructing the minimum energy tree after energy failures occur could prolong the network lifetime. They analyzed the effect of adding new sinks to the network lifetime.

Wint Yi Poet. al, purposed a local search technique for sink placement in WSN. A proper sink placement plays a major role in performance sensitive WSN applications. The goal of this research is to provide a better sink placement strategy. Its communication overhead is also low. WSN is consists of several sensor nodes for unattended operations. In the WSN the sensors have the ability to communicate with each other by sending their own data. Energy consumption is the most critical issue in WSN due to their battery operation. All design and control processes are usually focused on minimizing the energy consumption. The performance issues in WSN play a vital role in many applications. In WSN sinks can be mobile or stationary. In a WSN, multiple sinks in proper locations can strongly decrease the amount of energy use and the message transfer delay in communication.

CheickTidjaneKoneet. al, discussed the distributed clustering algorithm. It is suitable for large scale wireless sensor networks. It consists of sensor nodes and sink nodes. A two tiered hierarchical architecture is used to increase scalability and ensure performances and durability of system. A multi channel system is used to create a cellular structure by assigning one frequency channel per cluster. The simulation technique is used to evaluate and compare the impact of two distributed schemes. The connectivity and the scalability of the network are important design goals to ensure network performance. The hierarchical architectures are used to solve the scalability problem. In the WSN, the network is partitioned into several groups. For optimizing the energy and communication efficiency in the clusters, the multi channel system can be used. for this, cellular network approach is used to assign the frequency channel per cluster. In this paper author propose simple and distributed clustering algorithm which use multiple sinks and frequency channels to improve the performance.

Weifa Liang et. al, discussed about the benefits of placing optimal number of sinks for a wireless sensor network. It helps to increase the lifetime of network. it usually provides the number of hops from each sensor to its nearest sink. In this case the location of the sink provides in advance. It formulates the problem called joint optimization problem. It helps to find the number of sinks for the purpose of their placements. The heuristic approach is used here, which helps to decompose the problem into two parts and solve them separately. The wireless sensor network consists of many tiny sensors. In the WSN, energy consumption is the big problem. In the sensor network, there is a single static sink use, which has the unlimited power supply. It act as the gateway between the network and users. WSN focused on the improvement of network performance. WSN assumed that there is a single stationary sink. These sensors consume more energy than the others. It leads to the problem of single sink neighborhood problem.

Chaurasiya, et.al, proposed a new routing technique. As Wireless Sensor Networks consists of a large number of sensor nodes. These sensor nodes are connected through wireless medium. In the WSN the energy efficiency is the basic need. In this case, author propose an energy-efficient routing scheme called Enhanced Energy-Efficient Protocol with Static Clustering (E3PSC) which is basically a modification of an existing routing scheme, Energy-Efficient Protocol with Static Clustering (EEPSC). The qualitative and quantitative analysis is performed to establish the claim of energy efficiency of the proposed scheme. As, Enhanced Energy-Efficient Routing Protocol in wireless sensor network is a demanding task. This demand has led to many routing protocols. Most of these protocols find the minimum energy path or the shortest path routing. Always using these paths will soon make those nodes to lose their lifetime. Based on our experimental results, it has been found that E3PSC outperforms EEPSC in terms of network lifetime and energy consumption.

MaanKhedret. al, discussed that in the wireless sensor networks new challenges appear. when a large scale sensor network is use, the scalability issues arise in dense sensor networks . in these kind of network the multiple sources are needs to communicate with multiple sinks. The new protocols are developed to tackle the efficiency in routing. It also helps for the power management. The Proximity Based Data Dissemination use to provide high efficiency in data dissemination from multiple sources to sinks. It helps to reduce the communication overhead between sources and sinks. The sensor network is composed of a large number of sensor nodes. The wireless sensor networks will become an integral part of our lives. The sensor network applications require wireless ad hoc networking techniques. Many protocols and algorithms have been proposed for the wireless ad hoc networks.

#### **IV. PROPOSED SOLUTION**

A large scale wireless sensor network usually consists of thousands of nodes which have low memory, low processing power, and limited communication capacity. To collaboratively monitor environment and obtain global information, centralized data processing by base station is necessary. A base station is usually a powerful device which has much higher processing power, more memory and much higher communication capabilities. Energy savings is a top concern for wireless sensor networks. Sensors consume energy in their sensing, processing and communication tasks. The lifetime of the node is determined by how quickly its power is consumed. To reduce energy consumption one technique is using multi-sink scenario. In this technique by dividing the area in quadrants and providing individual sink to each quadrant using multi-sink in large network and providing caching nodes near the sink can help in reducing the energy consumption and improving network lifetime.

## V. CONCLUSION AND FUTURE SCOPE

As energy consumption and network lifetime of sensor nodes are most important issues in WSN, we have to design our system which consumes less energy and improves the network lifetime because sensor nodes are tiny nodes with non-rechargeable batteries and more prone to failure. By using the multi-sink scenario, caching technique is being used so as to reduce the energy consumption. When network is very large, we divide the network in quadrants and each quadrant will have an individual sink. When query is injected to sensor then the data is provided through multi-hopping. If TTL (time to live) expires then new data is obtained by sensors and given to the base station when query is injected. If the query is injected within a TTL, when it is not expired then it will be a energy wastage of sensor nodes to again respond by multi hopping, so to overcome this problem caching technique is used. In this technique, nodes near sink will be the caching nodes and save the data. So that when same query is injected when TTL is not expired then the caching node will provide the data and respond back to the base station. This will reduce the long path and reduces the energy consumption of the sensor nodes. Hence, network lifetime can be improved.

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