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SURVEY ARTICLE

Survey on Reliability Control Using CLR Method with Tour Planning Mechanism in WSN

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Abstract— In this proposed research, a new data-gathering mechanism for large-scale wireless sensor networks by introducing mobility into the network has been proposed. A mobile data collector, for convenience called an M-collector in this paper, could be a mobile robot or a vehicle equipped with a powerful transceiver and battery, working like a mobile base station and gathering data while moving through the field. An M-collector starts the data-gathering tour periodically from the static data sink, polls each sensor while traversing its transmission range, then directly collects data from the sensor in single-hop communications, and finally transports the data to the static sink. Since data packets are directly gathered without relays and collisions, the lifetime of sensors is expected to be prolonged. In this research methodology our main focus is on the problem of minimizing the length of each data-gathering tour and refer to this as SHDGP that is single-hop data-gathering problem. For the applications with strict distance/time constraints, we consider utilizing multiple M-collectors and propose a data-gathering algorithm where multiple M-collectors traverse through several shorter sub tours concurrently to satisfy the distance/time constraints. Even after using single-hop mobile data gathering scheme, the scalability and balance the energy consumption among sensors can be improved. This technology can be used in both connected and disconnected type of networks.

Keywords— MDCN, WSN, TDMA, STC, CLR

I. INTRODUCTION

In this research methodology, we propose a new data-gathering mechanism for large-scale wireless sensor networks by introducing mobility into the network. A mobile data collector or also called an M-collector, could be a mobile robot. It is like a vehicle equipped with a powerful transceiver and battery, working like a mobile base station and gathering data while moving through the field. An M-collector starts the data-gathering tour periodically from the sensor nodes, polls each sensor while traversing its transmission range. Then directly collects data from the sensor in single-hop communications, and finally transports the data to the static sink. Since data packets are directly gathered without relays and collisions, the lifetime of sensors is expected to be prolonged. In the proposed model, we mainly focus on the problem of minimizing the length of each data-gathering tour and refer to this as the single-hop data-gathering problem (SHDGP). We first formalize the

SHDGP into a mixed-integer program and then present a heuristic tour-planning algorithm for the case where a single M-collector is employed. Each sensor node stores the data in its buffer. Sometimes the situation comes wherein buffer gets full by its threshold value. Till the time MDCN comes and collects data from sensor node, it may get full and may loss data coming to it. In this proposed model with the help of Tour Planning we ensure reliability control. To ensure the reliability control we allocate database at each sensor node. In the cluster based architecture, we mainly ensure that each sensor node is energy efficient. Reliability is increased with the help of database attached at each sensor node. Sink node is decided by polling. The node which is energy efficient and on an average to all the other nodes is selected as a sink node.

Sensor nodes are deployed in remote environments to a multi-hop WSN over a wide range of area. All the sensor nodes collect the data and transfer it to sink node in a cluster based architecture. The nodes which are close to sink node gets overload resulting in decrease in lifetime of sensor node. So this method actually decreases the lifetime of sensor node and also loss of energy. To overcome this, we propose Tour Planning mechanism using which MDCN collects the data from all the sensor nodes and transfer it to sink node 1. When buffer of sensor gets full, the incoming data may lose. To avoid the data packet loss in this proposed model we ensure data reliability by using the concept of database at each sensor node. When buffer gets full, it stores all the data packets in the database with its header. Using this methodology data packet loss is avoided.

In WSN environment sensor nodes are deployed remotely over a wide range area. All the information generated at all the nodes are transferred at the sink node. The nodes which are close to sink node are overloaded in such mechanism. This results in the energy loss and reliability loss of those nodes. Such mechanism used in WSN does not provide reliability. There were no mechanisms present before to overcome this. Each sensor node stores all the data coming to it in it's buffer. But each buffer has its threshold value of capacity. If data gets full to its threshold value, all the later data packets coming to it are discarded and data is lost. There were no mechanisms present before to control this data loss. In the earlier mechanisms reliability factor was not there. As all the coming packets after the threshold value are rejected, data packets are lost in very high quantity. In this proposed model, we achieve both the main factors i.e. energy efficient (nodes closer to sink node are less energy efficient in the previous mechanisms) and the second is reliability control (data packet loss at the sensor nodes in the earlier mechanisms).

II. LITERATURE SURVEY

Wireless sensor networks (WSNs) have wide variety of applications and provide to many future. One of the most important applications is Sensor data collection. The sensor network collects the environment data from all sensor nodes periodically. The Time Division Multiple Access (TDMA) concept. The TDMA concept is used to efficiently collecting sensor data for any traffic patterns. There by reducing the latency of data collections. The proposed schedule improves the energy efficiency and time efficiency of sensor data collection. This method is used as the Traffic Patterns Oblivious algorithm (TPO). Sensor networks are collection of sensor nodes which co-operatively send sensed data to base station. As sensor nodes are battery driven, an efficient utilization of power is essential in order to use networks for long duration hence it is needed to reduce data traffic inside sensor networks, reduce amount of data that need to send to base station. The main goal of data aggregation algorithms is to gather and aggregate data in an energy efficient manner so that network lifetime is enhanced. Wireless sensor networks (WSN) offer an increasingly Sensor nodes need less power for processing as compared to transmitting data. It is preferable to do in network processing inside network and reduce packet size.

Efficient use of energy is challenging task of designing these protocols. Energy holed are created due to quickly drain the energy of a few nodes due to non-uniform distribution in the network. Normally, energy holes make the data routing failure when nodes transmit data back to the base station. Energy-efficient Hole Removing Mechanism (E-HORM) technique has been proposed to remove energy holes. In this technique, sleep and awake mechanism for sensor nodes to save energy. This approach finds the maximum distance node to calculate the maximum energy for data transmission. Wireless sensor network, the sensor nodes are distributed in various geographical dispersed areas for sensing the data and the sink node is used to collect data from different sensor nodes, therefore data collection is important issue in wireless sensor network. Every node in sensor network consist of three subsystem, first sensor subsystem which sense environment, second processing subsystem which perform local computation on sensed data and third communication subsystem which is responsible for message exchange.

Sensor nodes want to continue their lives with limited energy. Each of them using its own energy in minimum level and they aims to provide maximum efficiency to network. In this paper; We show that optimum packet length over data transmission at the data link layer. An example scenario is developed in OMNet simulation platform using IEEE standard 802.15.4. The optimal packet length is obtained in terms of energy efficiency. An Enhanced Forward Aware Factor-Energy Balanced Routing Method (EFAF-EBRM) based on

Data aggregation technique that has some key aspects such as a reduced number of messages for setting up a routing tree, maximized number of overlapping routes, high aggregation rate, and reliable data aggregation and transmission.

The data transmission in existing active measurement mainly feigns on the collection of energy reports and reduction of network overhead which proceeds in the languishment of scalability and data loss. This has been overcome with the passive measurement of data monitoring that provides the efficiency of data transmission in distributed network environment. This further achieves the power conservation for the entire network. Thereby, it saves the time in transmitting and receiving the data and further allows the consistent data flow in the shortest path provided from source to destination.

III. PROPOSED SYSTEM

Sensor nodes are usually thrown into a large-scale sensing field without a preconfigured infrastructure. Before monitoring the environment, sensor nodes must be able to discover nearby nodes and organize themselves into a network. Data gathering from cluster nodes to sink node is the main problem which needs to be solved. To solve the problem of minimum distance travelling the concept of MDCN has been used and the minimum distance has been found out so as the data has been sent to sink node in minimum hops. The main goal is to improve the data transmission reliability, to reduce the data transmission delay at the sink node and to reduce the data packet loss.

A. *System Design*

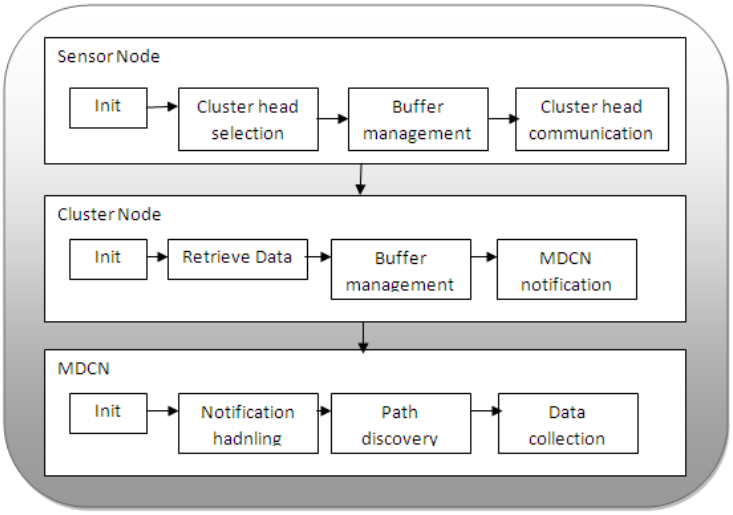

Fig. 1 Proposed System Design

1. Sensor Node :

- First all the sensor nodes in the sensor networks are initialized.
- Cluster head is selected using CSA(Cluster Selection Algorithm).
- Each sensor node is having buffer allocated to it. So the buffer management is also done.
- Sensor nodes sense the data and sends to the cluster head periodically after fixed time duration.

2. Cluster node:

- All the cluster nodes are initialized.
- Cluster nodes retrieve the data from the sensor nodes periodically.
- Cluster nodes also have buffer allocated to it.
- When the buffer at cluster node reaches the threshold value of the data, it sends the notification to the MDCN(Mobile Data Collector Node).
- As soon as the MDCN receives the notification from the cluster node, it moves to the cluster node and gathers the data from it.

3. MDCN

- First the MDCN is initialized. Depending upon the wsn area the no. of MDCN is selected.
- As soon as the MDCN gets the notification from cluster heads, MDCN gets activated to gather the data.
- The routing path is decided by using travelling salesman problem and shortest path has been found out.

B. *Objectives of Proposed System*

- Primary objective of the proposed research is to find the minimum distance from the cluster nodes to sink node so as to deliver packets without delay.
- Another objective of the proposed research is to reduce the data packet transmission delay and also to reduce the data packet loss at the sensor nodes.

IV. RESULT & ANALYSIS

Using a tool-based approximation of the work-area, we present an algorithm that covers every point of the approximate area for tasks such as floor cleaning, lawn mowing, and field demining. The algorithm, called Spanning Tree Covering (STC), subdivides the work-area into disjoint cells corresponding to the square-shaped tool, then follows a spanning tree of the graph induced by the cells, while covering every point precisely once. In this research problem we consider that there is a buffer allocated with each sensor node and with cluster node. Buffer monitoring is done in the WSN, in which if the buffer reaches the threshold value then the discard method is executed. Here threshold value is nothing but maximum level of buffer up to which the buffer can be filled. Consider it's 80% then in that case if the buffer is 80% full then the discard method is executed and here we use the concept of database which is allocated at each sensor node. As soon as the event is generated, the Mobile Data Collector Node plans a tour to collect the data. Till the time MDCN plans a tour and reaches a sensor node the data is stored in the database. But the database is in sleep mode unless the buffer reaches the threshold value. The database is activated only then when the discard method is executed. And then all the packets in the buffer are stored in the database with its header. That means all the data from buffer is stored in the database as it is. When the data is stored in the database the priority of packets or data changes to high and those data are collected on priority.

When we run proposed scenario (script) with ns-3.20, we will get all the related readings from which we will plot the graphs showing effects of this system on different parameters. Parameters we are going to use for this performance analysis are:

- End-to-End Delay
- Packet Loss Ratio
- Time Delay To Gather Data to Sink Node

The expected results from the proposed system includes the reduction in end-to-end delay and reduction in packet loss due to buffer overflow problem, also improved reliability along with network lifetime, efficiency and overall QoS of the network.

V. CONCLUSION

In this research paper, a mobile data-gathering scheme for large-scale sensor networks is introduced. We introduced a mobile data collector, called an M-collector, which works like a mobile base station in the network. An M-collector starts the data gathering tour periodically from the static data sink, traverses the entire sensor network, polls sensors and gathers the data from sensors one by one, and finally returns and uploads data to the data sink. Our mobile data-gathering scheme improves the scalability and solves intrinsic problems of large-scale homogeneous networks. By introducing the M-collector, data gathering becomes more flexible and adaptable to the unexpected changes of the network topology. In addition, data gathering by M collectors is perfectly suitable for applications, where sensors are only partially connected. For some applications in large scale networks with strict distance/time constraints for each data-gathering tour, we introduced multiple M-collectors by letting each of them move through a shorter sub-tour than the entire tour. The simulation results demonstrate that our proposed data-gathering scheme can greatly reduce the moving length compared with the covering line algorithm and is close to the optimal algorithm in small networks. In addition, it can prolong the network lifetime significantly compared with the scheme that has only a static data collector and the scheme in which the mobile data collector can only move along straight lines.

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