IMPROVE NETWORK LIFETIME AND LOAD BALANCING MOBILE DATA CLUSTERING FOR WIRELESS SENSOR NETWORKS

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ABSTRACT

The purpose of designing the project is to increase the life span of works and provide good scalability. Sensor networks faces problem such as inadequate amount of resources and they are vulnerable to environmental condition, thus decreasing sensor nodes life span. To resolve such problems multi user multiple-input/output (MU-MIMO) systems. in that multi cluster heads are implemented in each cluster to balance workload and facilitate dual data uploading..Wireless sensor networks which acts as sensor nodes sense the data and SenCar gathers information from environment. The data is forwarded to sink node from SenCar by means of single or multiple hops..WSN has found effective solution in fields like military, medical ,home etc. Advancement of technology in wireless communication enables distribution of cost effective and multifunctional sensor nodes within network area.

Index Terms: Wireless Sensor Network, Load Balanced Clustering, Dual Data Uploading, Multi User-Multiple Input Multiple Output (MU-MIMO)

I INTRODUCTION

A Wireless Sensor Network (WSN) is a distributed network and it comprises a large number of distributed, self-directed, tiny, low powered devices called sensor nodes alias motes [1]. WSN naturally encompasses a large number of spatially dispersed, petite, battery-operated, embedded devices that are networked to supportively collect, process, and convey data to the users, and it has restricted computing and processing capabilities. Motes are the small computers, which work collectively to form the networks. Motes are energy efficient, multi-functional wireless device. The necessities for motes in industrial applications are widespread. A group of motes collects the information from the environment to accomplish particular application objectives. They make links with each other in different configurations to get the maximum performance. Motes communicate with each other using transceivers. In WSN the number of sensor nodes can be in the order of hundreds or even thousands. In comparison with sensor networks, Ad Hoc networks will have less number of nodes without any infrastructure. Now a days wireless network is the most popular services utilized in industrial and commercial applications, because of its technical advancement in processor, communication, and usage of low power embedded computing devices. Sensor nodes are used to monitor environmental conditions like temperature, pressure, humidity, sound, vibration, position etc. In many real time applications the sensor nodes are performing different tasks like neighbor node discovery, smart sensing, data storage and processing, Data aggregation, target tracking, control and monitoring, node localization, Synchronization and efficient routing between nodes and base station.Wireless sensor nodes are equipped with sensing unit, a processing unit, communicationunit and power unit. Each and every node is capable to perform data gathering, sensing, processing and communicating with other nodes. The limited energy resources of sensor nodes and the though environmental conditions can limit the success of forest fire detection systems that are based on wireless sensor networks. Constant surveillance of the whole forest is required and this may cause excessive energy usage if not carefully planned.

1.1Overview of the system

A wireless sensor network is a collection of nodes organized into a cooperative network. Each node consists of processing capability (one or more microcontrollers, CPUs or DSP chips), may contain multiple types of memory (program, data and flash memories), have a RF transceiver (usually with a single Omni-directional antenna), have a power source (e.g., batteries and solar cells), and accommodate various sensors and actuators. The nodes communicate wirelessly and often self-organize after being deployed in an ad hoc fashion. Systems of 1000s or even 10,000 nodes are anticipated. Such systems can revolutionize the way we live and work. Currently, wireless sensor networks are beginning to be deployed at an accelerated pace. It is not unreasonable to expect that in 10-15 years that the world will be covered with wireless sensor networks with access to them via the Internet. This can be considered as the Internet becoming a physical network.

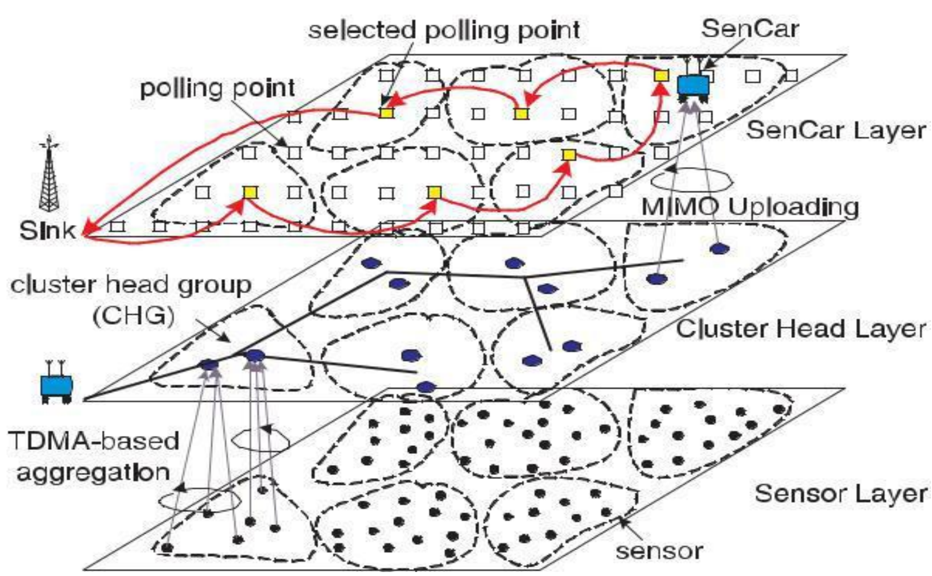


Fig 1.Illustration of the LBC-DDU framework

Wireless sensor nodes communicate with each other in a multihop manner to form a system called a wireless sensor network (WSN). The architecture of WSN systems depends on the IEEE802.15.4 standard, which specifies a physical (PHY) and medium access control (MAC) layer dedicated to a low-rate wireless personal area network (LR-WPAN). A WSN may include an enormous number of wireless sensor nodes placed in close proximity to an event to collect the required facts about the physical world and send these to the sink node (WSN base station). A WSN allows a user to productively sense and monitor from a distance. Miniaturized wireless sensor nodes have cost and size restrictions. In addition the computational speed, memory, energy and bandwidth are constraints that increase the WSN complexity.

Generally, the failures in a WSN are caused by the battery power exhaustion, inactivity periods, and vulnerability to destruction due to the small-sized sensor nodes. Most low-power wireless networks usually have unreliable links with limited bandwidth, and their link quality can be heavily influenced by environmental factors. Basically, the research challenges in WSNs are vast. The limited network lifetime is the most common problem in WSNs. The routing protocols must exploit the nature of the WSN and are related to various issues, including the fact that most data is only valid for a short time. The routing protocols designed for a WSN must therefore balance real-time performance and energy.

II.LOAD BALANCING MOBILE DATA CLUSTERING

The proliferation of the implementation for low-cost, low-power, multifunctional sensors has made wireless sensor networks (WSNs) a prominent data collection paradigm for extracting local measures of interests. In such applications, sensors are generally densely deployed and randomly scattered over a sensing field and left unattended after being deployed, which makes it difficult to recharge or replace their batteries. After sensors form into autonomous organizations, those sensors near the data sink typically deplete their batteries much faster than others due to more relaying traffic. When sensors around the data sink deplete their energy, network connectivity and coverage may not be guaranteed. Due to these constraints, it is crucial to design an energy-efficient data collection scheme that consumes energy uniformly across the sensing field to achieve long network lifetime. Furthermore, as sensing data in some applications are time-sensitive, data collection may be required to be performed within a specified time frame. Therefore, an efficient, large-scale data collection scheme should aim at good scalability, long network lifetime and low data latency. Several approaches have been proposed for efficient data collection in the literature. Based on the focus of these works, we can roughly divide them into three categories.

The first category is the enhanced relay routing in which data are relayed among sensors. Besides relaying, some other factors, such as load balance, schedule pattern and data redundancy, are also considered. The second category organizes sensors into clusters and allows cluster heads to take the responsibility for forwarding data to the data sink (as shown in. Clustering is particularly useful for applications with scalability requirement and is very effective in local data aggregation since it can reduce the collisions and balance load among sensors. The third category is to make use of mobile collectors to take the burden of data routing from sensors (as shown in Although these works provide effective solutions to data collection in WSNs, their inefficiencies have been noticed. Specifically, in relay routing schemes, minimizing energy consumption on the forwarding path does not necessarily prolong network lifetime, since some critical sensors on the path may run out of energy faster than others. In cluster- based schemes, cluster heads will inevitably consume much more energy than other sensors due to handling intra-cluster aggregation and inter-cluster data forwarding. Though using mobile collectors may alleviate non-uniform energy consumption, it may result in unsatisfactory data collection latency. Based on these observations, in this paper, we propose a three-layer mobile data collection framework, named Load Balanced Clustering and Dual Data Uploading (LBC-DDU). The main motivation is to utilize distributed clustering for scalability, to employ mobility for energy saving and uniform energy consumption, and to exploit Multi-User Multiple-Input and Multiple-Output (MU-MIMO) technique for concurrent data uploading to shorten latency.

III. SYSTEM ANALYSIS

3.1 Existing System

In the existing system sensor nodes are constructed along with the limited non-rechargeable battery. Moreover, sensor networks face various obstacles like high unguarded to severe environmental limited energy resources and conditions that have to be considered carefully. A distributed manner of Wireless sensor nodes are monitored area collects processes and the physical environment transmit its data. Static cluster head gathered all sensor nodes data. Energy level of nodes has to be monitored at every route requesting time. In Sensor communication. Consuming more energy for static Cluster head by collection of data from all sensor nodes thus energy of the node is drained easily. Thus life span of sensor node is decreased.

Disadvantages

- Waiting time is increased
- Unreliable
- Less data transmission rate
- Less effective

3.2 Proposed System

The clusters are constructed and the cluster heads can communicate data with base station after the selection of cluster heads. The network lifetime can be efficient through this method. Balancing the workload and facilitate dual data uploading can be done by multi cluster heads are implemented in each cluster and strategy of multi user multiple-input multiple -output (MU-MIMO).

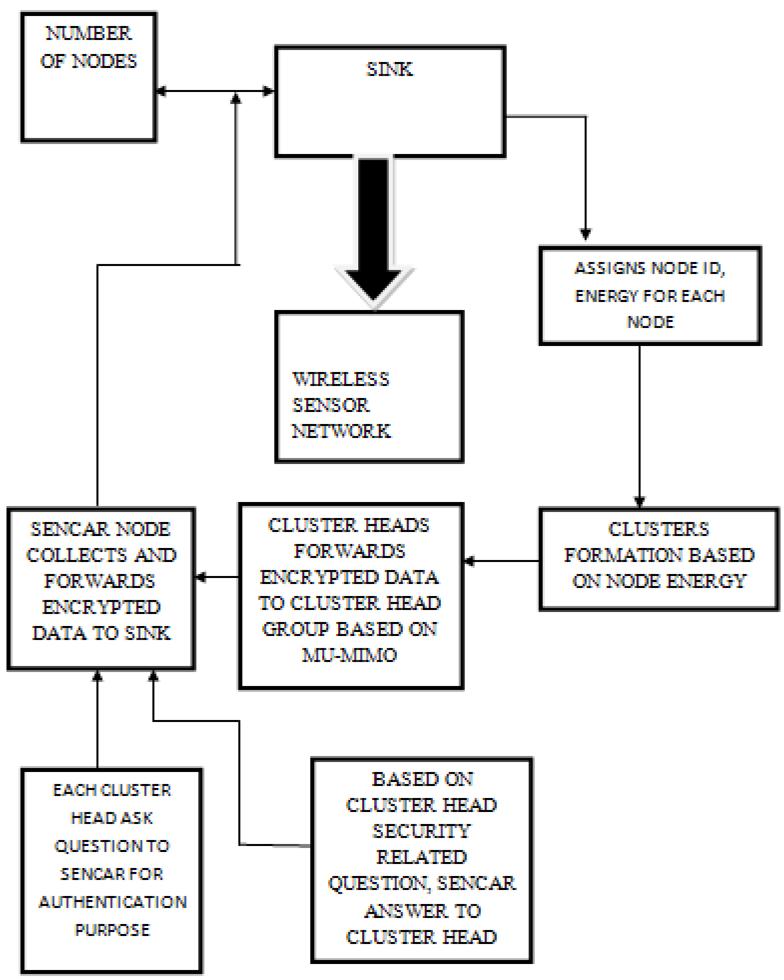
3.3 Modification Process

In the **Modification Process,** based on SenCar node selection sink generates question answer for authentication purpose. Incase intruder also come and collect whole data in each cluster. Avoiding this type of intruder arrival, sink uploads the answer to SenCar node for multiple cluster head location based questions.

Advantages

- Waiting time is decreased
- Reliable
- High data transmission rate
- More effective

BLOCK DIAGRAM



IV. SIMULATION AND RESULT

The main concept of this project is, constructing a base station with 'n' number of Nodes. These nodes in the network will help in requesting the data from other nodes. On assuming, from the base station these nodes are being moved. The base station will help in connecting all the nodes with the cluster head. The other information like Node Id and Nodedetails are stored in the Base station. For security purpose the base station will monitor every Node.

Fig 4.1: Based on location and node id's base station construct the Nodes

The energy for each node is obtained from the base station and based on the distance the cluster head and cluster group are selected. Based on the coverage area the cluster head selects the sub nodes. The node groups are formed by the cluster heads which selects the similar cluster heads like cluster head1 selecting cluster head2. By creating the node group, the data can reach the base station through any of the node in the group cluster head

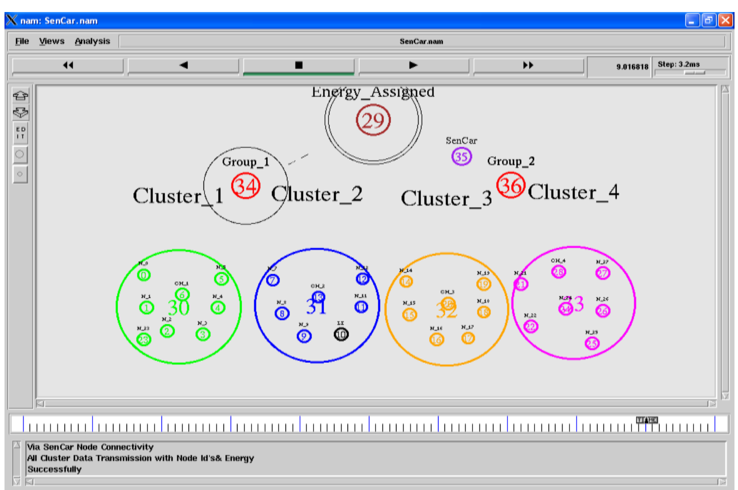


Fig 4.2: The entire cluster data transmission based on node id's and energy successfully

In this module, through group cluster head and SenCar node the data are sent to the base station by the source node in the cluster head. The data are received in the cluster head by the sensor nodes. Then these collected data are sent to the group cluster head via cluster head. Finally the collection of data is received to the base station which is collected by the SenCar node.

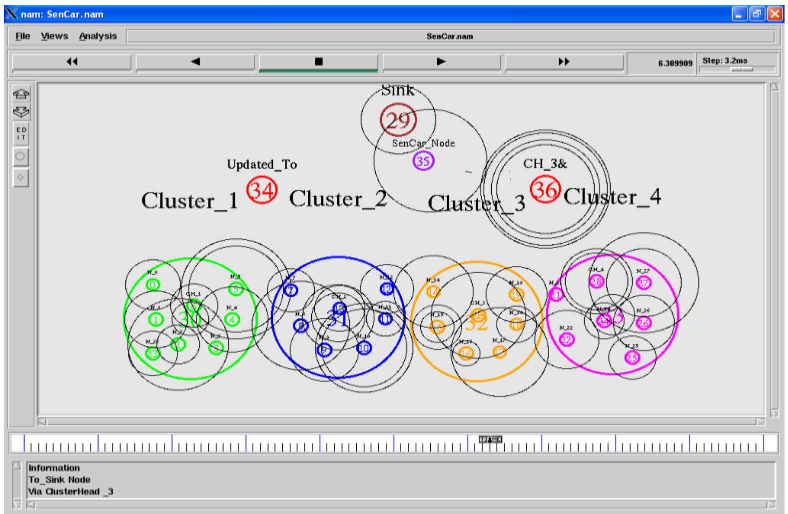


Fig 4.3: Information to sink node via cluster head

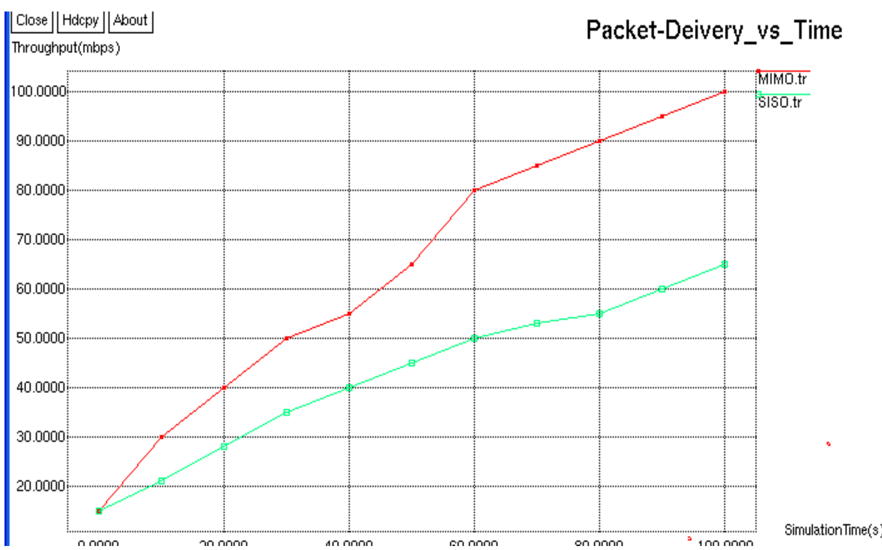


Fig 4.4: Packet delivery vs time in the data transmission

V.CONCLUSION AND FUTURE WORK

5.1 Conclusion

In this paper, we have proposed the LBC-DDU framework for mobile data collection in a WSN. It consists of sensor layer, cluster head layer and SenCar layer. It employs distributed load balanced clustering for sensor self-organization, adopts collaborative inter-cluster communication for energy-efficient transmissions among CHGs, uses dual data uploading for fast data collection, and optimizes SenCar's mobility to fully enjoy the benefits of MU-MIMO. Our performance study demonstrates the effectiveness of the proposed framework. The results show that LBC-DDU can greatly reduce energy consumptions by alleviating routing burdens on nodes and balancing workload among cluster heads

5.2 Future Enhancement

In the future, the proposed routing algorithm will be extended to sleep mode and therefore a longer network lifetime can be achieved. Apart from that, an analytical investigation of the new energy model include sleep mode will be performed.

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