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# An Efficient Clustering Scheme and Scheduling for Data Aggregation in RFID Network

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***Abstract: RFID (Radio Frequency Identification) is an automatic identification method to identify and track objects using radio waves. It is a collection of readers with sensing, computation and communication capabilities. These networks are constraint with energy; memory and computing power .The problem in networks are more battery power consumption. Data aggregation is used to gather and aggregate data in an energy efficient manner. It also reduces the number of packets to be sent by aggregating the similar packets in an energy efficient manner. Due to the mobility of readers between the clusters the leaving rate is high. To overcome the mobility of readers, an efficient clustering scheme for data aggregation is used, which minimizes the power consumption of the readers. It consists of cluster head scheme and cluster formation scheme. Another problem in RFID is a reader collision problem. It causes multiple reads of the same tag. To overcome this, the data aggregation is done by scheduling to eliminate the redundant data. Using clustering scheme, efficient data aggregation will be provided and the mobility of the readers will are minimized.***

***Key Words: data aggregation; wireless sensors networks; clustering; scheduling.***

## I. INTRODUCTION

**Radio frequency identification (RFID)** is one member in the family of Automatic identification and data capture (AIDC) technologies and is a fast and reliable means of identifying any material object. The significant advantage of all types of RFID systems is the non-contact, non-line-of-sight nature of the technology. Identity tagging development is proceeding on multiple fronts. First, standards are evolving for the various components of an RFID system including the transmission technology (the "RF" part) and unique identifiers (the "ID" part). Second, outside the realm of dedicated RFID systems, short-range radio-based Communication networks like Wi-Fi and Bluetooth have emerged which are increasingly used in RFID applications. Third, optical tagging solutions may compete with certain RFID applications, particularly those aimed at consumers. Lastly, both RFID and other tagging technologies are making their way to the edges of the network and into the hands of end-users, significantly increasing the potential for disruptive rather than incremental innovation. Before examining these trends and their implications in more detail, we will review the basics of RFID technology.

### A. CLUSTERING IN WIRELESS SENSOR NETWORK

In the Wireless Sensor Networks, (WSNs) a key challenge is to schedule the activities of the mobile node for improvement in throughput, energy consumption and delay. The existing system proposes efficient schedule based data aggregation algorithm using node mobility (SDNM). It considers the cluster-based myopic and non-myopic scheduling scheme for conflict free schedule based on the current and next state. It uses TDMA as the MAC layer protocol and schedules the aggregated packets with consecutive slots. Simulation results show that, SDNM is energy efficient, has less delay as compared with state-of-the-art solutions. TDMA techniques used for scheduling and aggregation of data. It uses consecutive time slots (TDMA) for improving energy consumption in the homogeneous WSN. The proposed centralized and distributed wake-up scheduling algorithm is designed for low data rate WSN and lacks in the delay of collecting data, needs effective schedule for mobile nodes with data collection. Distributed Time Scheduling Protocol (DATP) uses the dummy packet for checking the collision free time slot. It considers the event triggered applications for scheduling the aggregated data.

In addition, it checks for the tolerable limits of interference from the neighbour nodes within the same time slot. This approach has a limitation of overhead caused by unknown interference of neighbour nodes and has the impact of synchronization error. It is proposes the multipath routing structures for the efficient scheduling and collection of data to reduce the complexity and running time. The distributed TDMA scheduling algorithms when used for data collection incurs overheads in terms of energy and delay.

Problem of scheduling the aggregated information in the cluster-based network with the mobile node is

- *Decision of scheduling is based on the current state for intra cluster communication called myopic scheduling.*
- *Decision of scheduling which considers the current and future state of the mobile node for inter-cluster communication i.e. for the CH and CH to BS is non-myopic.*
- *Used to improve the Energy consumption, Throughput by a minimum number of conflicts.*
- *Reduce delay in communication of aggregated message to BS.*

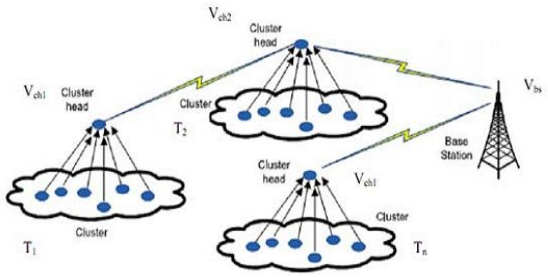
## II.RELATED WORK

In RFID network, the key challenge is to clustering head is selected using FIREFLY algorithm and data is aggregated by data aggregation algorithm. Firefly algorithm met heuristics work on the principle of the flashing lights of fireflies. The intensity of the light helps a firefly swarm move to brighter and attractive locations which can be mapped to an optimal solution in the search space.

The algorithm standardizes some of the firefly characteristics and can be listed as follows:

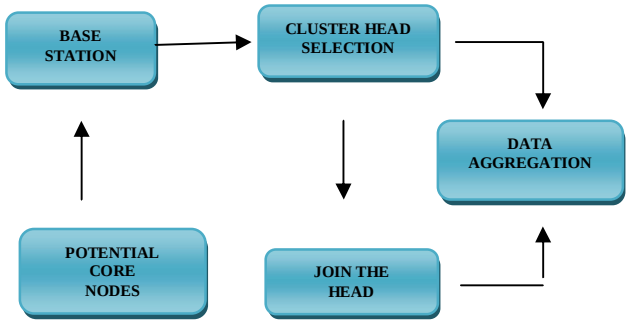
*(i) Each firefly can be attracted to another irrespective of their sex.*
*(ii) The brightness produced by the firefly is directly proportional to its attractiveness and between two fireflies; the firefly with higher brightness attracts the one which has lower brightness. A firefly moves randomly if it is not able to find a brighter neighbouring firefly.*
*(iii) In the mathematical model, firefly's brightness is based on the objective function. Firefly met heuristic is chosen for its capability of providing optimal solutions for multiobjective problems.*

In the proposed synchronous firefly algorithm, the fireflies are ranked and the best fireflies elected using tournament selection. The selected fireflies reproduce among themselves by crossover and mutation. The solution for the best fireflies obtained using tournament selection. After crossover and mutation, the new solutions are added to firefly pool and the next iteration of the firefly is continued.




*Cluster based network model*

## III. ARCHITECTURAL DIAGRAM




### A.POTENTIAL CORE NODES

The Potential core nodes include the schedule, speed and collection of data for the nodes. Here each nodes have a different speed , time and may be different datum.

### B. BASE STATION

The information of the nodes from the potential core nodes are sent to this base station. It keeps the details of each node.

### C.CLUSTER HEAD SELECTION

Cluster Head is selected by base station depending upon the speed of the node. Here the speed of the nodes is analyzed. High speed node is declared as head node. Other nodes are slaver node

### D.JOIN THE HEAD

Other nodes are joined to the head node. They are grouping.

### E.DATA AGGREGATION

Similar nodes are aggregated by data aggregation method.

## IV. TECHNIQUES USED

### A.CLUSTERING

In the clustering scheme reader and tags are grouped. The mobility, energy and direction of the nodes are analyzed.CH(cluster head) is selected based on the mobility, energy and direction. Firefly algorithm is used to select cluster head.

### B.FIREFLY ALGORITHM

In firefly algorithm, three techniques are used

- *Separation*
- *Cohesion*
- *Alignment*

### B1.SEPARATION

Minimum distance nodes are analysed for choosing cluster head. For the condition minimum distance node is applicable for work as head.

### B2.COHESION

Number of nodes are counted. For the condition which reader has more number of nodes that is possible to work as head.

### B3.ALIGNMENT

Directions are analysed. For the rule the number of slaver nodes of the header node must be travel the same direction of the header node. Above all the conditions are satisfied the head is selected and scheduling is allocated to the sub nodes which is send a data in order. And aggregation scheme is used to similar datum are eliminated. This process make as routine process.

## V.ADVANTAGES

Advantage of Firefly is not only includes the self-improving process with the current space, but it also includes the improvement among its own space from the previous stages. Firefly algorithm has some disadvantages such as getting trapped into several local optima. It sometimes performs local search as well and sometimes is unable to completely get rid of them. Firefly algorithm parameters are fixed and they do not change with the time.

## VI.CONCLUSION AND FUTURE WORK

This work proposed a Firefly based clustering protocol to select Cluster Head in RFID. LEACH protocol needs the user to specify probability for use with a threshold function to determine whether a node will become a CH or not leading to NP problem. In the proposed hybrid firefly algorithm, the best fireflies selected using tournament selection is allowed to reproduce among themselves by crossover and mutation. The proposed method achieves faster convergence and avoids multiple local optima. When compared to Efficient Schedule based clustering, the proposed hybrid firefly algorithm also increased the lifetime of the network. Future work can be carried out to investigate the impact on increasing specific quality of service parameter.

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