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**RESEARCH ARTICLE**



# A Prioritized Communication Based Clustered Architecture with Two Cluster Heads

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*Abstract— To improve clustered communication architecture, in this work a prioritized clustering mechanism is defined. The prioritization is here provided under energy based analysis. The improved formed cluster is defined here with two cluster head. One cluster to control the communication for high energy nodes and other to control the communication for low energy nodes. The work includes a parametric analysis to identify the CH and second cluster head. The cluster head selection will be performed based on the energy, distance and residual energy parameters. Each cluster head will be handled separately for the re-election process. While performing the re-election, the balancing between the high and low priority nodes will be maintained. The work has provided the energy balancing over the network so that the network life is improved. The presented work is implemented in matlab environment. The obtained results show the effective improvement in packet communication and network life.*

**Keywords-** Clustered, Routing, Priortization, Communication

## I. INTRODUCTION

Sensor Network Processing is one of the most required forms of Sensor Network processing to extract the information effectively and to conclude some valuable information from it. Some of the information is integrated in Sensor Network in different forms. To extract this kind of information from Sensor Network, the feature extraction is applied over the Sensor Network. There are different methods to retrieve the information from Sensor Network under different aspects, applications and Sensor Network types. Some of such information representation or extraction approaches includes the segmentation, Clustering etc. The information retrieval process from Sensor Network is shown in figure 1

Sensor Network Clustering is one of the most required tasks to extract information from Sensor Network. It is used in different contexts to perform the Network or pattern communication as well as to perform the categorization of the Networks based on information analysis. It is actually defined in a hybrid scenario that itself covers the concept of Network categorization, Network communication as well as enable the Network search. Clustering is about to characterize the Sensor Network under the visual part analysis with view analysis. There are number of application areas where the Clustering plays an important role. These application areas include the disease Clustering in medical Sensor Network, , Network Clustering in real time Sensor Network etc.

Sensor Network Clustering is actually to define a tag or the annotation to the Sensor Network based on the feature based analysis. The Clustering process is applied on a set of arbitrary Sensor Network collected from any primary or secondary source. These Sensor Network belong to specific domain such as medical Sensor Network, geographic Sensor Network, handwritten characters, biometric Sensor Network etc. The Clustering procedure is divided in two broader approaches called Generalized Clustering and Rule Based Clustering.

### A) Generalized Clustering

Generalized Clustering perform the analysis on the pre-classified Sensor Network and represent it as the training Sensor Network. The descriptors are applied on these Sensor Network Sensor Network to represent different classes. These annotations are applied on each training Sensor Network manually without performing any analysis. When Clustering process is applied, at the earlier stage, the training Sensor Network analysis is performed. This analysis is performed to identify the descriptive features for each class. Now when some Sensor Network is accepted from the user and the feature analysis is performed on it. Now these extracted features will be compared with the training set features. The Sensor Network with the maximum feature match will be elected as the matched Sensor Network and the class of that matched Sensor Network will be considered as the class of input Sensor Network.

### B) Rule Based Clustering

This kind of Clustering approach does not require any training set. These methods rely on the clustering process that performs the distance based analysis between the input Sensor Network and the available Sensor Network Sensor Network. This distance measure can be performed on complete Sensor Network or the featured Sensor Network extracted from the Sensor Network itself. Based on this distance based analysis, the Sensor Network with minimum distance match will be elected as the matched Sensor Network and its class annotation is placed on input Sensor Network.

## II. EXISTING WORK

In this section, the work done by the earlier authors respective the network architecture and the relative communication is defined. The work also include the study of different protocols. Some of the work done by the earlier authors is described here. Ioan Raicu [1] discussed the sensor under different communication aspects such as energy resources, localization, transmission cost and the communication capabilities. The network was formed to improve the network life and the life of network nodes. The work also able to improve the network life and the throughput by reducing the maintenance and the overheads. Author defined the synchronized protocol so that the communication establishment overheads will be reduced. Author also estimated the overhead respective to the routing algorithm so that the control message will be reduced and the effective communication will be drawn over the network. Sang-Sik Kim et.al [2] defined an agent based network architecture to control the communication under the mobility network. The work include the network lifetime improvement so that the packet delivery ratio will be improved and the effective communication will be performed. The work include the data delivery ratio and delay analysis. The work also includes to maintain an infrastructure less communication so that

effective communication will be drawn over the network. Shangwei Duan *et.al* [3] proposed a task management and analysis based network architecture so that the effective task oriented lightweight communication network will be established. Author also improved the network effectiveness in terms of management protocol.

Ying-Hong Wang *et.al* [4] presented a mobile sink based network architecture so that the effective sink sensing will be performed so that the energy effectiveness will be achieved under the clustered architecture. The another important aspect of clustered network is to perform the routing scheduled queue so that effective path generation over the cluster will be performed. Shafiq Hashmi *et.al* [5] defined an improved performance mechanism to achieve the synchronized communication under the realistic clustering architecture. Author defined some realistic and optimum schemes so that effective communication will be achieved over the network. Peng-Jun Wan *et.al* [6] has defined uniform point process under a square or disk region so that the probability of the coverage changes with the sensing radius and the boundary effective communication is performed so that the network throughput will be improved.

### III. VLEACH PROTOCOL

In this section, the VLeach protocol is defined along with its functionality and the evolution. In year 2000, W.R. Heinzeloman has defined a protocol, to control the sensor network under a clustering architecture, called leach Protocol. This protocol is able to perform the hierarchical communication and provide the energy effective communication under the defined architecture. Author has defined the network under the traditional communication constraints specification so that the distance and energy adaptive communication will be performed. Author defined the class structure analysis approach to perform the clustering so that the network load will be distributed as well as network life time will be improved. Author also reduced the redundant communication so that the energy problems over the network will be reduced. Over the time, the problems in leach protocol are identified and relatively some changes in leach are performed and improved forms of leach were introduced by different authors. These improvements were focused on to provide more reliable and energy effective network so that network throughput will be improved as well as balanced network with synchronized communication will be achieved. The effectiveness of the clustering protocols is described under the following features

1. Adaptive and self configured cluster construction
2. Controlled localization so that effective communication will be performed
3. Energy Effective media access
4. Application specific communication

V-leach is the improved form of leach protocol which contains two cluster heads in a cluster called CH and Vice-CH. Here CH is actually responsible for all kind of communication and till the CH is active Vice-CH remains idle. When the CH dies, it is replaced by Vice-CH so that the communication will not stop even if the cluster head dies. It reduces the cluster reformation over the network so that network setup time is reduced and the efficiency and the reliability over the network is achieved. The basic network architecture of VLeach is shown in figure 1.

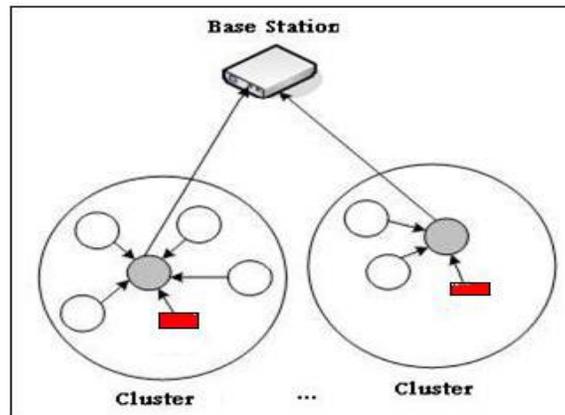


Figure 1 : VLeach Architecture

#### IV. PROPOSED WORK

A sensor network defines the network nodes under the energy specification. With each communication over the network some amount of energy is lost because of this energy criticality and balancing is one of the major challenges in sensor network. This challenge becomes more critical when the network is a heterogeneous network. In this presented work, the effective cluster head re-election scheme is defined for clustered heterogeneous sensor network. This work, the heterogeneity of nodes will be defined as the node priority. The nodes will be at first divided in terms of high priority and low priority nodes. Now while forming the clusters over the network, a balance will be maintained between the numbers of high and low priority nodes in a cluster. The clustering will be performed based on the density ratio between the high priority and low priority nodes. Now to perform the effective communication, each cluster head will be defined with two cluster head. One cluster head will handle the communication with high priority nodes and other will handle the communication with low energy nodes. The cluster head selection will be performed based on the energy, distance and residual energy parameters. Each cluster head will be handled separately for the re-election process. While performing the re-election, the balancing between the high and low priority nodes will be maintained.

The presented work is about to define an effective clustering and cluster re-election approach for a heterogeneous network. The presented work has represented the heterogeneity over the network in the form of high and low priority nodes. While performing the cluster formation, a balance will be maintained between the high and low priority nodes. The will also define two types of cluster head for each cluster. One cluster head will handle the communication with high priority nodes and other will handle the communication with low priority nodes. The energy and density balancing clustering will improve the cluster and the communication over the network. The basic flow of work is shown here under

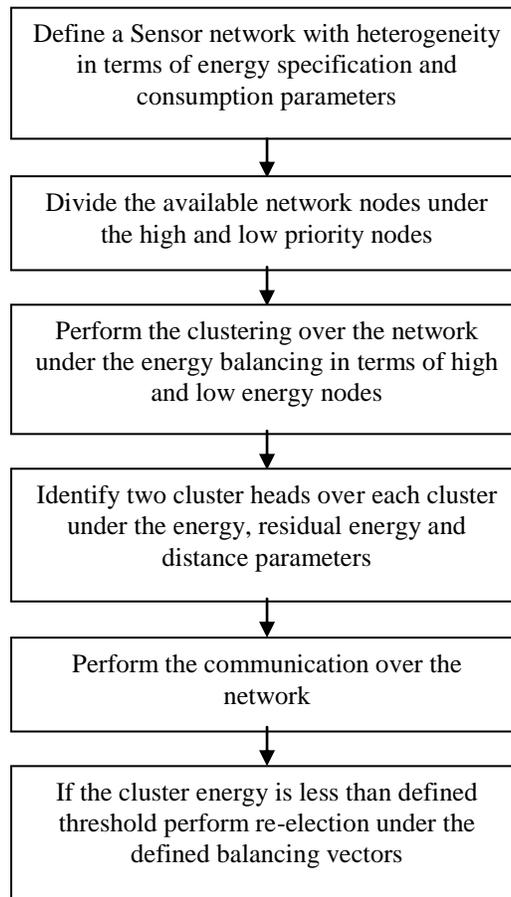


Figure 2 : Flow of Work

The primary cluster head will be responsible for the communication and to interact with base station. After the primary head selection, second cluster head will be elected based on the maximum connected nodes at minimum distance ratio. The second

cluster head accept the data from the low energy nodes by using an aggregative path and pass it to the primary cluster head. The presented work includes the direct clustered communication and multi-hop aggregative routing concepts to improve the network effectiveness and to save the energy. If the primary cluster head will die new cluster head will identified by same procedure, and relatively the secondary cluster head will be identified. The presented work will reduce the congestion over the primary cluster head and improve the network life by saving the energy. The algorithm associated with the proposed work is shown in figure 2.

### V. RESULTS

In this present work, an improve LEACH protocol is defined so that the effective communication will be performed over the network. The presented work is simulated in matlab environment with some network parameters. The network parameters are shown in table 1

Table 1 : Network Parameters

Parameters	Values
Network Area	100x100
Number of Nodes	100
Initial Energy	1 J
Transmission Energy	5 nJ
Receiving Energy	5 nJ
Forwarding Energy	5 nJ
Number of Rounds	1000

The analysis of the work is done under three main parameters called, network life, packet communication and packet communicated to base station.

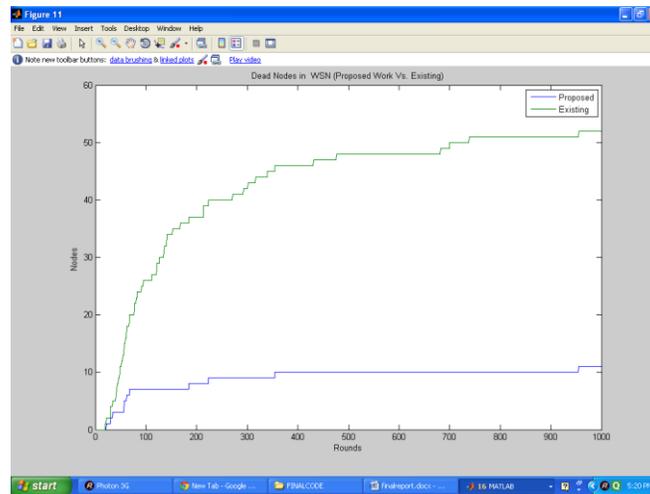


Figure 3 : Dead Node Analysis (Existing Vs. Proposed)

Here figure 3 is showing the dead node analysis in case of existing and proposed approach. Here x axis shows the number of communication rounds and y axis shows the number of dead nodes in the network. Figure shows that, initially no node is dead. As the communication performed, nodes start losing energy and start losing their life. The figure shows that, initially the first node die at same time in both existing and proposed approach. But later on the dead node chances reduced in case of proposed approach. The figure shows, in existing approach about 54 nodes are died whereas in case of proposed approach only 11 nodes die.

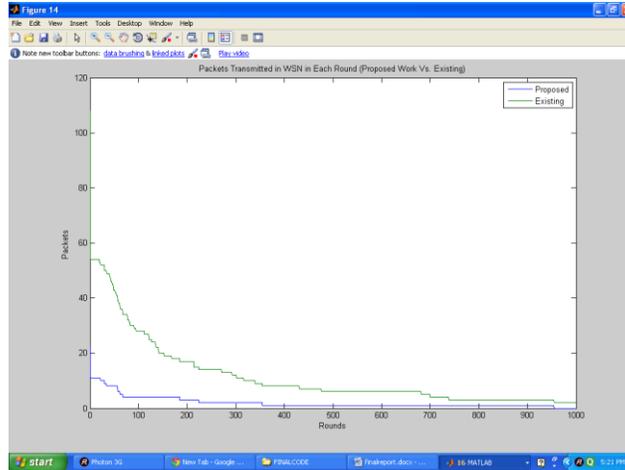


Figure 4 : Packet Communication (Existing Vs. Proposed Work)

Here figure 4 is showing the packet communication analysis for each round in case of existing and proposed approach. The communication of nodes is done to the cluster head and cluster head performs the communication with base station. The end information is transferred to base station. Here number of packets communicated to base station is shown. Here x axis shows the number of communication rounds and y axis shows the packets communicated. Figure shows that, initially no communication is performed. As the communication performed, packet transmission is increased. As the nodes start losing the energy, the packet communication rate is decreased.

## VI. CONCLUSION

In this paper, an improved Leach protocol is defined to improve the clustered architecture. In this architecture, each cluster is defined with two cluster head. One to control high energy nodes and other to control low energy nodes. The obtained results from system shows the effective improvement in network life and packet communication.

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