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**AN ENERGY EFFICIENT LINK AWARE  
CLUSTERING SOLUTION FOR WIRELESS  
SENSOR NETWORKS**

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**Abstract-** Wireless Sensor Networks are consisting of clusters of devices that using sensor technologies such as semiconductors, embedded micro-sensors and micro systems technology. Routing protocol is main part of WSN that can share the data information to the sink node. The existing works can maintain that data information but it contains issues like latency time delay, Cluster Head and Gateway not works based on priority. So we proposed a new energy efficient mechanism called Link Aware Clustering that provides high efficient relay and works based on high priority.

**Keywords-** Wireless Sensor Networks, Link Aware Clustering, Routing Protocol, Gateway.

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## 1. INTRODUCTION

Wireless Sensor Networks (WSN) are consists of cluster of systems using sensor nodes deployed in a particular areas. WSN is communicates data through wireless links to a central system. Wireless Sensor networks always monitor the physical processes and magnetic properties using the presented communications infrastructure. Fig 1 shows the model of the Wireless Sensor Networks with Cluster Nodes.

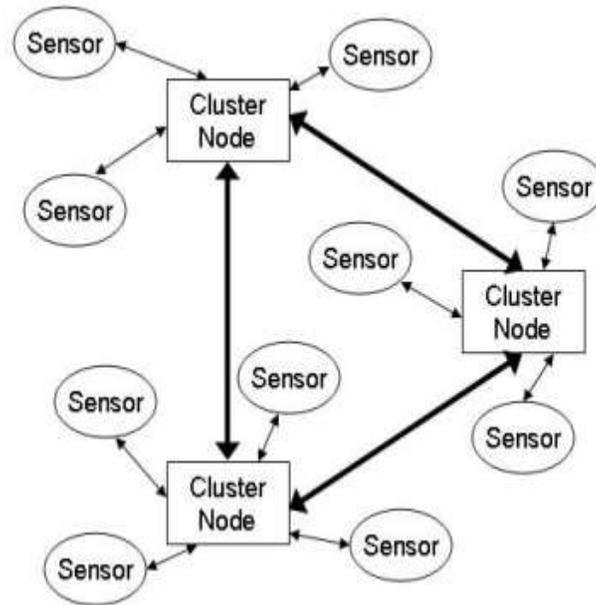


Fig 1: Wireless Sensor Networks with Cluster Node

Wireless sensor networks works based on the emerging technologies such as Microsystems technology, Wireless communication technologies, Information Technologies, semiconductor devices, MEMS [1] and embedded micro-sensors. All wireless sensor networks consist of a lot of tiny sensor nodes, each equipped with the number of sensors, a microprocessor and a radio transceiver [2]. These nodes are able of independently form a network through which sensor readings can be propagated. Each node have an autonomous processing capacity, the data can be processed as they bypass through the network. The limitations of the equipments, levels of high demands and physical environment with which the nodes must operates, protocols and algorithms must be designed to provide strong and efficient energy consumption. They have the potential to build up telecommunications in a way related to what we call the internet of things by offer a wide range of dissimilar applications a few of which remains to be exposed.

Sensor networks have a high potential for applications in various fields, including the following:

- Environment- finding the level of Ocean temperature
- Health- Collecting data information on patients conditions
- Military applications- Recognition and Surveillance
- Industrial areas- Monitoring and maintaining the oil containers and Gases

## 2. PROBLEM STATEMENT

In existing work the Wireless sensor networks works based on three main categories of routing protocol. They are Chain based, Tree based and Cluster based [3]. In Chain based routing protocol, if the node is extreme from the sink becomes a leader, it uses extra energy to transmit to the sink. In addition, if the number of sensor nodes on the chain increases means the chain length also increases. Then in Tree based routing protocol, the root node become a bottleneck for message reporting, so it's quickly killing there battery power. Besides the supplementary levels a tree have the higher transmission delay for the protocol generates. This approach groups all sensor nodes into multiple clusters [4].

Last one is cluster based model, one node is nominated as the Cluster Head (CH), which manages and controls the cluster. Multiple clusters are connected via gateways (GW). This paper can uses the cluster based routing

protocol. Because clustering is more efficient in one-to-any, one-to-all, one-to-many or many-to-one communications it can help to deliver packets and improving the routing performance [5] [6]. The Fig 2 shows the network model of the Cluster based routing protocol.

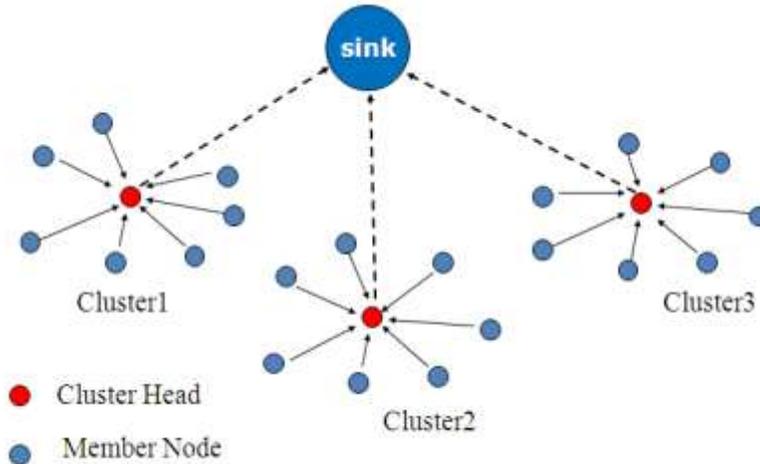


Fig 2: Network Model for Cluster based routing protocol

In the above network model can works as follows. All clusters are contains some sensor nodes. Sensor nodes are freely moves from any cluster to any other clusters. Here distance of sink node is high so long delivery delay, disappointing routing performance and unreliable link are occurred.

### 3. PROPOSED SYSTEM

4. In this paper we proposed the Link Aware Clustering Mechanism; called LCM in Wireless sensor networks. The proposed LCM is works fully distributed system because the CH and GW candidates are self determined whether they should become the Cluster Head (CH) and Gateway (GW) nodes, respectively.

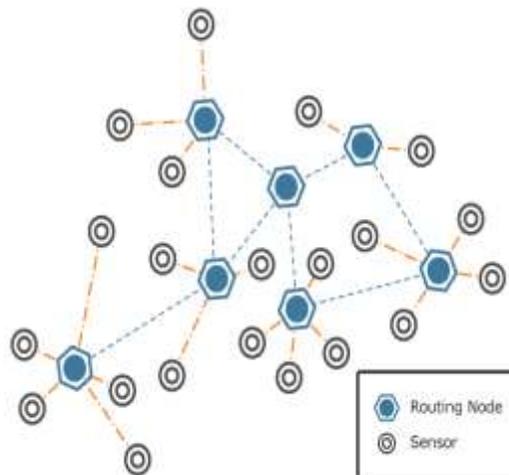


Fig 3: Sensor Network

The LCM always consumes less energy rather than the PC, PC-LQ, and PC-RE. This is mostly because the candidate that the PC-RE selects is associated with a high value of ETX. In the LCM mechanism can use two counter named as, Predicted Transmission Count (PTX) and Expected Transmission Count (ETX). PTX is a candidate derives that is a large PTX value if it connects to sensor nodes with a top quality or supports more transmission counts. ETX is used to evaluate the level of link quality [7]. Let  $i$  and  $j$  are two nodes means the  $ETX_{ij}$  can be defined as,

$$ETX_{ij} = \frac{1}{P_{ij}^f \cdot P_{ij}^r}$$

This Link Aware Clustering is forced by the Passive Clustering (PC) technique. This PC proposes a link aware clustering mechanism (LCM) to maintain the energy efficient routing in Wireless Sensor Networks. The most important goal of the LCM is to set up a reliable and persistent routing path by determining appropriate nodes to become Cluster Heads (CH) and Gateways (GW). In the LCM, the Cluster Head and Gateway candidates use the link condition (e.g., quality) and node status to determine a clustering metric, called the predicted transmission count (PTX).

## 5. CONCLUSION

A Link Aware Clustering mechanism is used to provide high energy efficient routing in wireless sensor networks. It uses the predicted transmission count (PTX). Based on the derived highest priority the LCM can select the best nodes to become cluster heads or gateways. The PTX provides the level of effective report quality of nodes can support and also provides high transmit power consumption and link quality.

In wireless sensor networks, the LCM can be works in unicasting only. In Future we research some new mechanisms that provide solutions to supplementary communication types, such as multicasting and geocasting.

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