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ENERGY-BALANCED ON DEMAND CLUSTERING ALGORITHM BASED ON LEACH-C IN WIRELESS SENSOR NETWORKS

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ABSTRACT:

As the use of Wireless Sensor Networks (WSNs) has grown enormously, the need for energy-efficient management has also risen. This paper presents a new approach to clustering wireless sensor networks and determining cluster heads. Energy-Balance on Demand Clustering Algorithm Based on LEACH-C is proposed. . Clustering algorithms have been widely used to reduce energy consumption. The algorithm adopts centralized cluster formation and distributed CH selection methods. Minimum energy clustering is used to divide the network into clusters, while energy and total communication distance are considered as secondary criteria to select optimal CH. From simulation results the proposed algorithm outperforms LEACH-C in life time, stability period and performance efficiency.

INTRODUCTION:

Traditional routing protocols for WSN are not enough optimal in terms of energy efficiency and load balancing. Clustering is introduced to balance the load and increase the lifetime of the network. Clustering is sample of layered protocols where the network is composed of several clusters of sensor nodes. Cluster head aggregate all the data received from cluster members and then send that data to the base station. The transmission between cluster members and cluster head is said to be intra cluster communication, where as the transmission between cluster head and sink is known as inter cluster communication [1]. Clustering is an energy-efficient communication protocol which can be used by the sensors to report their sensed data to the sink. Each cluster is managed by a special node, called cluster head, which is responsible for managing the data transmission activities of all sensors in its clump Routing in wireless sensor networks differs from conventional routing in fixed networks in various ways. There is no infrastructure, wireless links are unreliable, sensor nodes may fail, and routing protocols have to meet strict energy saving requirements [8]. Low Energy Adaptive Clustering Hierarchy (LEACH) is a TDMA-based MAC protocol which is integrated with clustering and a simple routing protocol in wireless sensor networks. LEACH is a distributed clustering protocol which utilizes randomized rotation of local CHs to evenly distribute energy utilization between the nodes of WSNs. The goal of LEACH is to provide data aggregation for sensor networks while providing energy efficient communication that does not predictably deplete some nodes more than others.[13].

In this paper, we propose energy-balanced on demand clustering algorithm based on LEACH-C, which adopts a centralized cluster construction and distributed CH selection approaches. Nevertheless, the algorithm relates the steady-state duration to node energy status to avoid data loss due to energy depletion of CH or member node. After receiving location and energy information from nodes, the BS forms the clusters via iterative algorithm, computes distance to neighbours for each node. Then the BS broadcasts the clustering information, distance to neighbours, and total energy to all nodes. Upon receiving this information every node can decide whether to become a CH within its cluster or not. The proposed algorithm outperforms LEACH-C and demonstrates the advantage of balanced energy consumption overall the network and reduction of control overhead.

RELATED WORK:

A new energy-efficient cluster based routing protocol [2], which adopts a centralized clustering approach to select cluster headers by generating a representative path. The burden of network configuration and routing from sensor nodes can be greatly reduced. By using a representative path, the sink node selects cluster headers and generates clusters in a distributed

manner. The LEACH's cluster-head selection algorithm [4] introducing distance- based factor, called LACH-L. In LEACH-L, the clusters are re-established in each round. Each of these rounds consists of a set-up and a steady-state phase. New cluster heads are elected in each round and as a result the load is well distributed and balanced among the nodes in the network. PEGASIS [5] (Power-efficient Gathering in Sensor Information Systems) is a greedy chain-based power efficient algorithm. PEGASIS is based on two ideas; chaining, and data fusion. In PEGASIS, each node can take turn of being a leader of the chain, where the chain can be constructed using greedy algorithms that are deployed by the sensor nodes. PEGASIS assumes that sensor nodes have a global knowledge of the network, nodes are stationary (no movement of sensor nodes), and nodes have location information about all other nodes. Clustering algorithm [6] is based on min-heap on the number of sensor nodes allotted to the CHs. EEEBCP scheme [7] is a modification Energy-Efficient Protocol with Static Clustering (EEPSC) scheme. In EEPSC, cluster-head selection is performed based on the residual energy of the nodes and temporary-cluster-head is used for cluster-head selection process. A hierarchical approach divides the network into layers. Nodes are grouped together to form the clusters and each cluster has a cluster head, responsible for routing inside the cluster as well as between different clusters. Clustering provides inherent optimization capabilities at the cluster heads [8]. Conventional contention-based access method [9] develops a new analytical model to calculate the energy consumption at each sensor node per unit of time given a specific routing configuration. The energy consumed by a sensor node corresponds to that used to transmit its own generated messages as well as to relay the pass-through traffic of other sensor nodes. Hierarchical Unequal Clustering Algorithm (HUCA) [14] is based on unequal clustering. It uses the local knowledge to form into three phases. They are Grid formation, CH node election, Data collection.

EXISTING SYSTEM:

ECHERP uses an energy efficient mechanism to select a node as the cluster head. ECHERP considers the current and the estimated future residual energy of the nodes, along with the number of rounds that can be cluster heads in order to maximize the network lifetime. The protocol computes the energy consumed using the Gaussian elimination algorithm in order to minimize the overall network energy consumption at every single round. The selection of CH is done on the bases of minimization of total energy consumption; the node that does so is elected as the CH rather than the node having the highest energy left, as in many other protocols. ECHERP also adopts a multi-hop routing scheme to transfer fused data to the base station.

PROPOSED SYSTEM:

The proposed scheme is a cluster-based algorithm that modifies the clustering process. thus, both the cluster formation and the CH selection methods had been modified. Clustering achieves a significant improvement in terms of energy consumption, and provides scalability. clustering is one of the basic approaches to control topology and design energy-efficient distributed WSN. Energy is the major concern, then balanced energy consumption is important in energy conservation.LEACH - C is a popular cluster-based protocol, which provides distributed adaptive clustering and periodic cluster head (CH) selection rotation. At the beginning all nodes send their energy and location information to BS. Then the Base station form the clusters using the k-mean clustering algorithm to divide the network into minimum energy clusters.After cluster formation select the cluster head, a node with more residual energy and less communication distance to become CH in its cluster. communicates with BS directly. Otherwise, CH sends a message to other CHs including cluster head ID, distance to BS and energy. Neighbor CHs save this message at first, then feedback their own messages. Based on the feedback, the CH chooses a neighbor CH which has more residual energy and close to BS as its next hop node.Finally cluster head send the data to the base station. Every node checks its energy before sending data and saves its residual energy after sending data to CH or to the BS. For any CH, if the energy before sending data is below the predefined value the BS informs the entire network nodes about the starting of cluster head selection process at the next round. The system continues these rounds until one of the member nodes energy decreases below its low level.

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