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AN EFFICIENT ENERGY ROUTING METHOD FOR WIRELESS SENSOR NETWORKS USING FAF

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ABSTRACT

Wireless sensor networks are made of sensor nodes with restricted battery life and transmission capability. Existing algorithms such as LEACH and FAF-EBRM do not have effective node selection mechanisms. To overcome this issue a Fuzzy logic rule based approach (FAF-EBRM) is proposed in this work and has been found to be more suitable of using fuzzy is to manage tolerance fuzzy logic implementation. Here Fuzzy logic rule is used to select the next hop node to transmit the data. The advantage of using fuzzy logic is to manage tolerance for imprecision and low cost of computation.

Index terms: Energy Balance Forward Aware Factor (EB-FAF), FuzzyLogic (FL)

I INTRODUCTION

WSN is an emerging technology that can modernize communication technology. Absolutely it has the potential to significantly change the way we live. The power of WSN lies in creating a persistent environment capable of remote sensing, monitoring and control. In the present scenario of global warming, WSN can enable fine grain remote monitoring of components. A radio, a processor sensors and battery. A WSN is formed by closely deployed sensor nodes in an applications. In most of the deployments, the sensor nodes have self-organizing capabilities, to create an appropriate structure in order to collaboratively perform a particular task. Wireless Sensor Networks are found more suitable for applications such as vigilance, precision cultivation, smart homes, automation, vehicular traffic management, environment monitoring, and disaster detection. In the wireless sensor networks, each sensor node collects signal from a limited region. This signal is getting processed in that sensor node. Information is generally transmitted to the observers.

Sensor nodes consume energy while receiving, processing and transmitting the information. In most of the cases, the sensor nodes are equipped with batteries which are not rechargeable. Therefore, energy competency is one of the important design goal in wireless sensor network. Nodes can be distributed into a number of small groups, called clusters, for collecting the data through efficient network organization. In general, each cluster has a cluster-head

which coordinates the data gathering and aggregating process in a particular cluster. Each cluster member forward its data packets to the cluster-head. Clustering in wireless sensor networks guarantee the basic performance achievement with a large number of sensor nodes. In other words, clustering improves the scalability of wireless sensor networks. This is because clustering minimizes the need for central organization and promotes local decisions.

The major benefits of clustering are:

1) Clustering provides the spatial reuse of resources to increase system capacity. For example, if the clusters are not neighbor, they can use the same frequency for wireless communication.

2) Routing informations of a cluster is shared with only other cluster-heads or cluster gateways. This restriction reduces number of transmissions performed for distributing routing information, By using the advantage of clustering, more energy efficient routing protocol have been implemented. When cluster structure is used in WSN, the local changes need not be reflected to entire network. This reduces information processed by the sensor nodes and stored in sensor nodes.

3) However, generally sensor nodes are deployed randomly by throwing them to the target region. Hence, this approach is not a practical one for real environments in most of the case. Some of the clustering algorithms employ uncertainties in the Wireless Sensor Networks. So, fuzzy logic rule can be used to avoid uncertainty. Basically, a fuzzy logic for blending a different clustering parameters to elect cluster heads according to the defuzzified output of fuzzy if-then rules. In the next section, we briefly discuss about the existing protocols available.

II RELATED WORK

Energy dissipation over the network. LEACH also performs local data compression in cluster heads to decrease the amount of data that is forwarded to the base station. (2), Geographic routing is an attractive localized routing scheme for wireless sensor networks (WSNs) due to desirable scalability and efficiency. Maintaining neighborhood information for packet forwarding can achieve a high efficiency in geographic routing changes frequently due nodes mobility and availability.

Here, a novel on line routing scheme is proposed, called Energy-efficient Beaconless geographic Routing(EBGR),which can provide loop free, fullystateless, energy efficient sensor-to-sink routing at a low communication overhead without the help of prior neighborhood knowledge. In EBGR, each node first calculates its ideal next-hop relay position on the straight line toward the sink based on the energy-optimal forwarding distance, and each forwarder selects the neighbor closest to its ideal next-hop relay position as the next-hop relay using the Request-To-Send/Clear-To-Send (RTS/CTS).

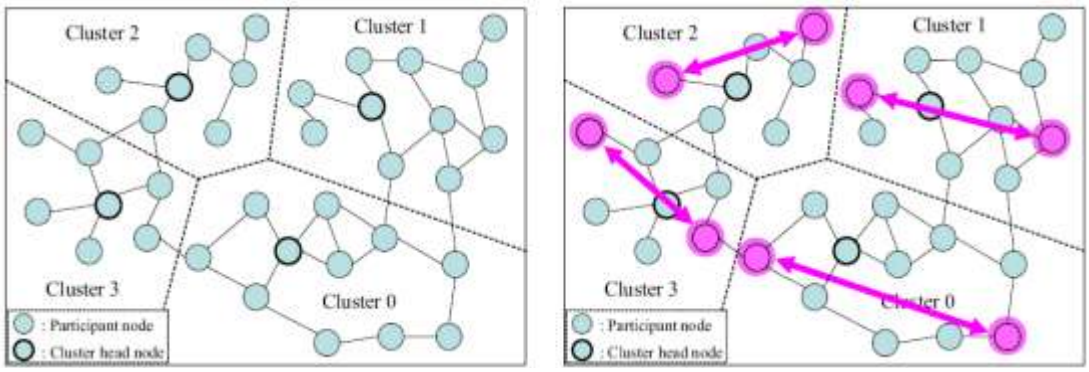

Fig 1 Cluster in WSN

The application of sensor networks are endless, limited only by human imaginations. It also has some issues. Each sensor node has limited life time. So the network to be formed to avoid the data lost. For that the nearby nodes are formed as clusters. Among the nodes, one node is selected as the cluster head. Distance between the nodes and the cluster head also to be minimized for effective transmission of data.

Life time of sensor node is very less. To avoid the data lost in destroy of one sensor node, the additional node is needed to transmit data of the corresponding sensor node. For managing all the nodes, one head is needed. So all the sensor nodes are grouped in to clusters and cluster head is selected to forward the message to the nodes. The major challenges is how to forward the message with minimum energy.

III EXISTING SYSTEM

BBV model is widely used to analyze the real complex networks such as scientist collaboration network and worldwide airport network. Similar to SCN and WWAN, there are numerous nodes and community structures (Clusters) In WSN, importantnodes (cluster heads) have more connections than common nodes. Many researches on “energyhole “show that the data flow on each connection .varies considerably in WSN because of these different distances to the sink node. Thus it is not suitable represent a connection as connected(“1”) or connection less(“0”).

Global information is limited in WSN of IA sensors exchange information in their “localworld”. The overall network and local-world theory is appropriate to model WSN of IA.

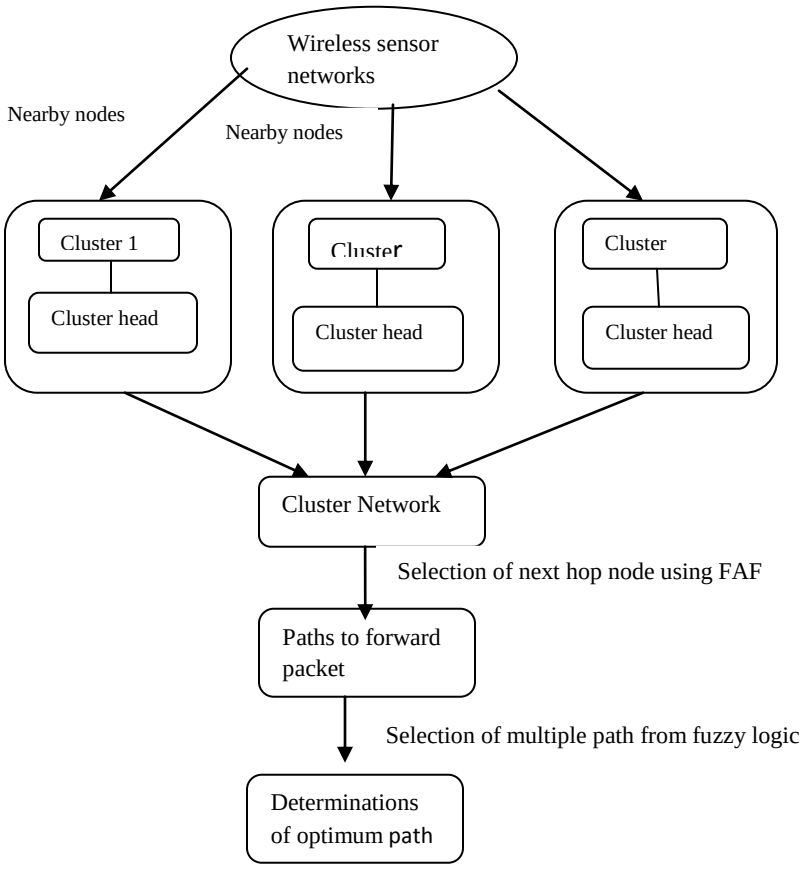

Fig 2 Block Diagram Of a fuzzy logic based path determinations.

IV PROPOSED SYSTEM

A fuzzy clustering approach to the WSNs is analyzed to maximize its lifetime. This approach is a distributed competitive algorithm. It selects the cluster-head via energy based competition among the tentative cluster heads which are selected using a probabilistic model. This approach mostly focuses on wisely assigning competition ranges to the tentative cluster heads. In order to make wise decisions, it utilizes the residual energy and distance to the base station parameters of the sensor nodes, In performance Analysis of Clustering protocol handle uncertainties in competition ranges to the tentative cluster-heads which have higher residual energy levels, because they can serve as larger region. The system is implemented using the following.

4.1 Cluster Network Formation

Minimum number of cluster heads is identified to optimize energy in cluster formation for handshaking mechanism stateless, energy-efficient sensor-To-sink routing at a low communication overhead without the help of prior

neighborhood knowledge. In(4) T-LEACH stands for threshold based LEACH because it replaces cluster heads based on the threshold value of residual energy on the sensor nodes.In traditional protocols relating to the cluster optimization, the authors proposed that the number of cluster heads be reduced to decrease energy consumption or that energy efficiency base optimal cluster sizes be constructed to extend the survival time of the network.

A set or randomly scattered wireless sensors.Sensors within a cluster are expected to be communicating with a cluster head only.The cluster heads summarize and process sensor data from the clusters and maintain the link with the base station. The clustering is driven by the minimization of energy for all the sensors.

Most clustering algorithms utilize two techniques which are selecting cluster heads with more residual energy and rotating cluster heads periodically to balance the energy consumption of the sensor nodes over network. These clustering algorithm do not take the location of the base station into consideration causes hot spot problems in multi-hop WSNs. Thecluster heads near the base station die earlier, because they will be in heavier relay traffic than the cluster-heads which are relatively far from the base station .in order to solve this problem and to balance energy consumption of clusted-heads,next module is raised.

4.2 Optimization of energy

After cluster network formation, Optimization of energy is done based on fuzzy logic rule. It is applied to select the next hop node for routing the data from one node to another node. It is achieved by considering the following parameters in selecting the next hop node .They are

- Time factor
- Node factor
- Threshold value

Time factor

The base station broadcasts the information to the node at time (t1), the acknowledgement received from the node at time (t2), then the Time Factor is calculated using

Time Factor=t2-t1

Threshold value

Let p be path from the source to any destination and let r be the energy level of the ith node in the path p. The cluster-heads are stochastically selected. Inorder to select the cluster heads, each node generates a random number between 0 and 1.If the number is smaller than the threshold, T, the node becomes a cluster round. The threshold is calculated as follows.

$$T = \frac{P}{1-PX(r \bmod^{1/P})}$$

P is the number of the nodes becoming the cluster-heads and r is the number of current round. If a node once has been a cluster-head in the last 1/P rounds, it cannot be a cluster-head again.

Node Factor

Node factor for each node is determined. Node factor for each node is determined. Node Factor for nodes taking less time to communicate with base station.

V PROPOSED ALGORITHM

Wireless Sensor Networks uses Forward Aware Factor routing algorithm for static data collection and event detection. The algorithm is implemented as follows.

- Determine the path from the source to the sink and also the next hop node for all the nodes in the corresponding path.
- It determine the set of all of the nodes that has destination as the node i
- Select the nodes that closer to Sink which constitutes the set of all of the possible next-hop nodes and the furthest node determine the path.
- Energy density is determined for the next hop node
- To calculate the weight of edges between i and each nodes.

VI CONCLUSION

The proposed method uses the fuzzy logic for selection of next hop is based for the transmission because the crisp logic is not possible in imprecision situation. The results show that the node with higher remaining energy,lower distance has more probability.Being selected as the next node in forwarding the data to base station. In the experimental results show that FAFEBRM outperforms both. The proposed one balances the energy consumption, prolongs the function lifetime, and guarantees high QoS for Wireless Sensor Networks.

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