Geographic based Hybrid Algorithm for Wireless Sensor Network

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***Abstract*—**The concept of Energy Efficient Heterogeneous Clustering (EHC) technique has been used here. Here the cluster is formed in an effective technique for prolonging the network lifetime. The energy-efficient heterogeneous clustering technique that periodically selects the cluster heads which has the maximum connected domination node. According to the hybrid algorithm, the residual energy is used, such as the utility of the sensor to its neighbour's node. Then by using the concept of a route optimization technique in clustered WSNs the routing path is chosen dynamically with the help of Open shortest path first protocol. If the data packets can send efficiently to the source to destination without any loss of energy. Finally the Network life time work is maximized by reducing the packet delay, and energy-consumption of WSNs.

***Keywords*—**Cluster; Domination Node; Hybrid Algorithm; OSPF; Packet Delay; Route Optimization.

***Abbreviations*—**Efficient Heterogeneous Clustering (EHC); Forwarding Group Multicast Protocol (FGMP); Maximum Connected Domination Set (MCDS); Open Shortest Path First (OSPF); Wireless Sensor Networks (WSNs).

I. INTRODUCTION

MANY Wireless Sensor Networks (WSNs) have been designed in recent years that have concentrated serious attention. This fact is originated from the rapid advances in wireless communication and integrated circuits Wireless sensor network consists of a large number of tiny sensor nodes. The main responsibility of such networks is to collect sensed information from environment and send them back to sink to be processed. Common applications of wireless sensor networks are industrial controlling, target tracking, traffic flow monitoring, environmental monitoring and military services. Up to now, most routing protocols existing in wireless sensor networks consider only energy efficiency and few results show real-time requirements. Real-time routing protocols have time restriction which is so important parameter to be considered in routing modelling. Real-time communication is necessary in many mission-critical applications of wireless sensor networks such as target tracking in battlefield environments, emergent event triggering in monitoring applications, fire fighting and etc.

II. LITERATURE SURVEY

In this section most of the topics are related to increase. In network lifetime has been discussed here. In this Cluster heads are elected in energy efficient manner. We have also focused on some topics relating to the mobility, packet delay and some other parameters. Padmalaya Nayak & Anurag [1], **"**A Fuzzy Logic based Clustering Algorithm for WSN to extend the Network Lifetime". Here the network lifetime is increased by using fuzzy logic and clustering algorithm (LEACH Protocol).The battery power consumed is less. Fuzzy Logic is the derivative process so it takes more time. Praveen Kumar et al., [2], "Energy balanced dynamic cluster routing approach for WSN", IEEE International conference on recent trends in electronics, information and communication technology. The network lifetime increased by using efficient cluster head selection technique and Dynamic route selection. Dynamic route selection provides

reliable transmission of data. Time consumed to transmit the packet is more. Manisha Rathee & Sushil Kumar [3], "Quantum inspired genetic algorithm for energy efficient clustering in wireless", IEEE 1st international conference on power electronics**.** The Network lifetime is increased by using Evolutionary algorithm (Genetic).NP hard problem is solved by genetic algorithm. This process increases only 34% of the network. Ajay Sharma et al., [4], "Tree based heuristic algorithm for maximizing network lifetime", International Conference in Advanced Communication Control and Computing Technologies (IACCCT). The network lifetime is increased by using local optimization (Spanning tree).Power efficient data gathering and aggregation. Balanced tree implementation is difficult. Nandkumar et al., [5], "H-MOHRA: Heterogeneous Multi-Objective Hybrid Routing Algorithm for Mobile Wireless Sensor Networks**.** The network lifetime is increased by using H-MOHRA and data packets are serviced using cost function based on many metrics such as Mean energy utilization, control overhead, response time, connection quality measures Mobility and heterogeneity have been increased-MOHRA improves jitter only by a factor of 22.70% and 18.16% as compared to SHRP and DyMORA. Thus by making a survey and using the concept of energy efficient clustering, the dominant nodes are selected and the packets have been sent without traffic. Hence the parameters like packet delay, routing overhead and the packet delivery ratio has been identified. Thus the performance of the network has been improved compared to other algorithm.

III. DISCUSSION

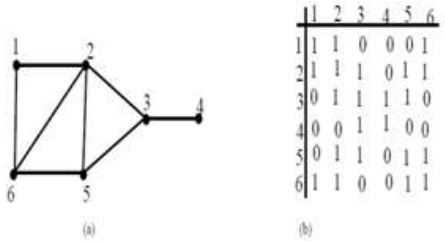
3.1. Energy Efficient Clustering

There is a variation of Destination-Sequenced Distance for heterogeneous network which is collectively. It aims to minimize the requirement of system-wide broadcasts to its extreme. It does not maintain routes from every node to every other node in the network rather they are discovered as and when needed and are maintained only as long as they are required. The algorithms primary objectives are,

1. To broadcast discovery packets only when necessary.
2. To distinguish between local connectivity management neighbourhood detection and general topology maintenance.
3. To disseminate information about changes in local connectivity to those neighbouring mobile nodes that is likely to need the information.

3.2. Domination based Node

In graph theory, a dominating set for a graph $G = (V, E)$ is a subset of V such that every vertex not in adjacent to at least one member of D. The domination number $\gamma(G)$ is the number of vertices in a smallest dominating set for G. The dominating set problem concerns testing whether $\gamma(G) \leq K$ for a given graph G and input is k. The nature of ad hoc networks makes them different from wireless infrastructure networks which typically include base stations that are not battery constrained. Energy management strategies can conserve the energy of the battery powered nodes by taking advantage of the energy available at base stations. In contrast, an ad hoc network consists of small, battery powered devices only. The development of new energy management techniques is critical for practical deployment of these networks. It is a NP complete decision problem in computational Therefore it is believed that there is no efficient algorithm that finds a smallest dominating set for a given graph. Figure 1 shows the sample graph and correspondingly finding the dominant node.



V--→Vertices
E-→ Edges

Figure 1: (a) Graph and (b) Finding a Domination Node

In each example, each white vertex is adjacent to at least one red vertex, and it is said that the each vertex is dominated by another vertex. The domination number of this graph is 2 (2 Node) show that there is a dominating set with 2 vertices, and it can be checked that there is no dominating set with only 1 vertex for this graph. Finally the 2 Node is highly data transfer packets to the entire node.

3.3. Connected Domination Set Formation

Connected Dominating Set has been proposed as the virtual backbone to e the broadcasting in wireless ad hoc networks. Most recent research has extensively focused on the construction of 1-Connected 1-Dominating Set in homogeneous networks. However, the nodes in the CDS need to carry other node's traffic and nodes in wireless networks are subject to failure. Therefore, it is desirable to construct a fault tolerant CDS. In this paper, we study a general fault tolerant CDS problem, called k-Connected m-Dominating. Using disk graphs to model homogeneous networks, we show that our algorithms have a constant approximation ratio. If the source is not a gateway host, it forwards the packets to a source gateway, which is one of the adjacent gateway hosts. This source gateway acts as a new source to route the packets in the induced graph generated from the connected dominating set.

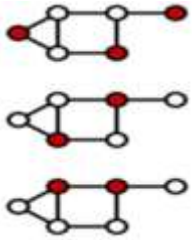
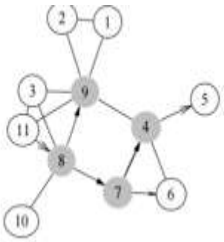


Figure 2: Maximum Connected Domination Set (MCDS)

Eventually, the packets reach a destination gateway, which is either the destination host itself or a gateway of the destination host. In the latter case, the destination gateway forwards the packets directly to the destination host. If the source is not a gateway host, it forwards the packets to a source gateway, which is one of the adjacent gateway hosts. This source gateway acts as a new source to route the packets in the induced graph generated from the connected dominating set. Eventually, the packets reach a destination gateway, which is either the destination host itself or a gateway of the destination host. In the latter case, the destination gateway forwards the packets directly to the destination host. Similar to the Forwarding Group Multicast Protocol (FGMP).



forwarding table of node 8

destination	member list	next hop	distance	m1	m2
9	()	9	1	1	0
4	(5)	7	2	1	1
7	(6)	7	1	0	1

forwarding table of node 7

destination	member list	next hop	distance	m1	m2
4	(5)	4	1	1	1
7	(6)	7	1	0	1

sender = 11, *receiver* = {4, 5, 6, 9}, *FG* = {7, 8}

Figure 3: Example Graph and Forwarding Table for Nodes

3.4. System Module

Initializes a node
Domination set
Domination Node
Neighbour Node Discovery
Flow of Data Packets

IV. PROBLEMS AND SOLUTIONS

The main problem in the existing wireless sensor network is, if there is some delay occurs for route establishment since the routing information is not readily available; many control packets are used for finding the route. The main constraints in MANET include high mobility, low bandwidth and low energy. Due to the high mobility, frequent disconnections are more in MANET. In all reactive algorithms, when the route is broken then the route re-establishment process diminish the performance of the network by inducing more overhead. There is a limited computation, communication, memory, and energy resources. Less limitation on the lifetime of a network and there is more data redundancy in the network.The problem in wireless sensor network can be solved by combining two algorithms; one of them is based on energy efficient clustering and the other one open shortest path first that have more reliability. Depending upon the threshold of the node cluster head is selected thus leading to little energy consumption and more reliability. If the current routes fail the packet dropped is transmitted to receiver and by decreasing energy consumption, increase network lifetime. It minimizes energy consumption of nodes.In this cluster heads are elected in an energy efficient manner. In order to prolong network lifetime, energy consumption must be balanced in all of sensor nodes and shouldn't be a subset of nodes which consume more energy. Therefore network lifetime of energy consumption increases.

V. RESULT

5.1. Interpretation of the Graph

The graph 5.1 denotes the existing system has more time delay compared to the proposed system. At zero performance, the time delay value of existing system is 7.3000Ms and the delay value of the proposed system is 2.4000Ms.At finally, the time taken to transmit the packets has been reduced from 1.55mbps to 0.5mbps.

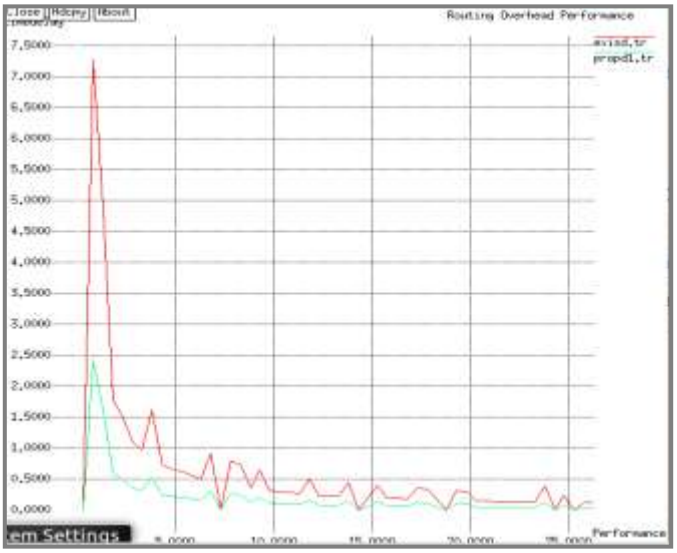


Figure 4: Routing Overhead Performance in Fuzzy Logic based LEACH Protocol and EHC Technique

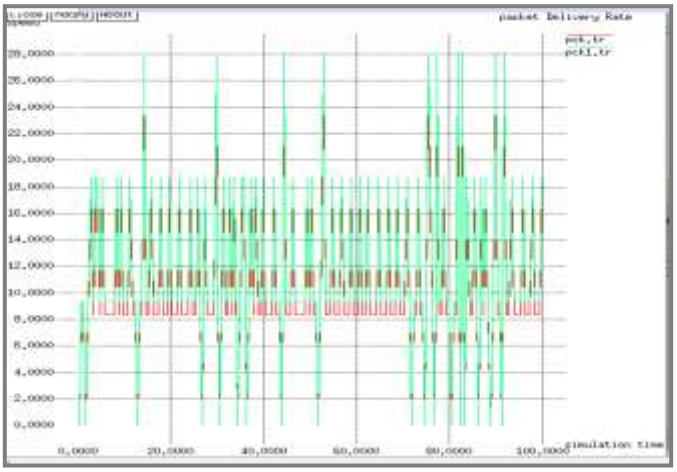


Figure 5: Packet Delivery Rate in EHC Technique

The graph 5.2 denotes the constant speed taken to deliver each packet. Within the time 0 to 100ms, the packets have been transmitted with a constant speed of 18mbps.If we send data to a node that the particular node should be failure then it find the dominant node and this dominant node send the data to the destination node.

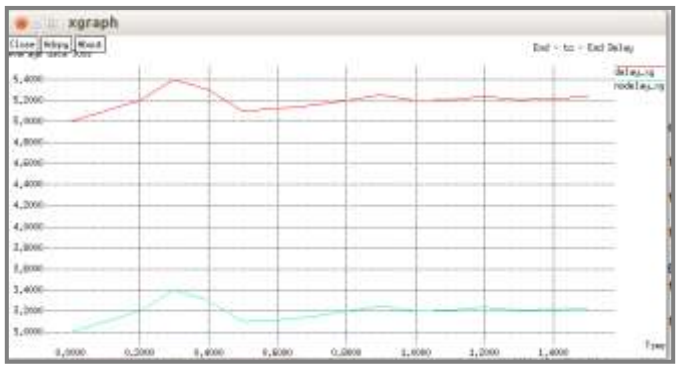


Figure 6: End to End Delay in EHC Technique

Figure 6 denotes average loss in data with delay and without delay. If there is delay the average data loss is 5.00 and if there is no delay the data loss is 3.00. It has been concluded from the simulation result that the proposed protocol using OSPF is stable compared to fuzzy model.

VI. CONCLUSION

This paper explains the route discovery process in MANET and analyze the problem occurs during the route reestablishment process. When the route failure occurs the route establishment process starts from the beginning in the normal case. This causes many packet losses and the retransmission of the lost packet is high. But in domination set based routing (DBR) the route reestablishment, proposed here, is carried out by dominant nodes and the delay gets reduced. Accordingly new route discovery process is not required, while the active communication can be continued. This ensures the performance enhancement in terms of Packet Delivery Ratio (PDR), number of packets dropped and the network overhead. The hybrid algorithm works well in large networks also. However the determination of domination set, though required only occasionally could be a matter of concern in respect of overall computational complexity.

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