International Journal on Applications in Information and Communication Engineering
Volume 1: Issue 11: November 2015, pp 21-23. www.aetsjournal.com ISSN (Online) : 2394-6237

Implementation of Distributed Cluster Head Scheduling (DCHS) Algorithm for Minimizing the Energy Consumption in WSN

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***Abstract*—** Clustering technique is not a routing protocol, it is a method that aggregates nodes into groups to make network management easier. The implementation of clustering schemes facilitates the performance of protocols by improving throughput, scalability and power consumption. Cluster heads are elected from among the ordinary nodes which based on the residual energy. The nodes are backbone of the network and also to perform power control routing functions. The primary task of cluster head is to discover the routes for distant messages and forward inter-cluster packets. If the destination is in the same cluster it is forwarded to the destination node. If it is in a different cluster, then the cluster head of the source node routes the packet within the network to the cluster head of the destination node. Our proposed DCHS algorithm to achieve the entire coverage area of the network and to minimizing the time between sender and receiver. Our main objective is to reducing delay and minimizing energy consumption between the nodes in wireless sensor networks (WSNs).

***Keywords*—** Cluster head, DCHS, MILP, Energy Consumption.

I. INTRODUCTION

Scheduling is the works are divided among individual nodes and to give the time slot to the node. So, it can avoid the interference in the network. At the same time cluster head does not get the same information from individual node.

In this paper, we consider the relationship of interference and delay constraint in the wireless sensor network. The individual nodes are sends the information among same link which causes the interference and also delay will occur. Cluster head sense the same information it will drop the one of the packet and sends the other packet to the destination node. In order to avoid the delay some packets will be loss, so we go for DCHS algorithm. Wireless sensor network has large number of heterogeneous sensor devices. In order to the receiver receives a message and successfully decode it, one of the condition is that the receiver must be in the transmission range but inside the interference range of a transmitter, node cannot receive the signal successfully, so we use the scheduling technique.

In this paper we organized as follows: in section II we describe the related works, in section III we describe the proposed system, in section IV we describe the simulation result, in section V concludes the paper.

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II. RELATED WORKS

The interference-aware energy- aware joint scheduling problem (IEJS) can be performed as mixed integer linear program (MILP) to find the optimal energy consumption of the network. This system only considered about energy minimization does not consider the delay and packet loss. First they construct the initial scheduling, the start time of a node must be greater than or equal to the finish time of all its predecessor nodes. Then, the data aggregation tree is formed. In that, all children nodes transmit their data to the parent node. Once the parent node receives data from all its children, it performs data aggregation and transmits this aggregated message to its parent node. It takes more time to send the information to t he base station.

The nodes are transmit their message simultaneously three problem may occur.1.interference increases, delay and packet loss. If the finish time of the last node is greater than the deadline, then this set of tasks and messages cannot be feasibly scheduled. The energy consumed by the radio of a wireless device is made up of two components: the transmission energy and the circuit consumption energy. The transmission energy is a function of several variables like the transmitter-receiver distance, transmission time, channel gain and atmospheric noise. The circuit consumption energy on the other hand is a linear function of the time the transmitter and receiver circuit need to be on. For the transmission energy calculation, consider M-ary Quadrature Amplitude Modulation (MQAM) as the modulation scheme. Changing the modulation levels implies varying the number of bits in each symbol. Decreasing (increasing) the modulation level implies reducing (increasing) the number of bits in each symbol. This requires transmitting more symbols. Given a constant symbol rate, more symbols means more transmission time.

The modulation level decreases and the transmission time increases, the transmitter and receiver circuit need to be on for a longer duration. At lower transmitter-receiver distance, continuously reducing the radio modulation level may lead to increased energy consumption

III. PROPOSED SYSTEM

The nodes are randomly deployed in the network. Some of the nodes are formed as cluster. Then the cluster head should be selected (CH) among the nodes. The cluster head sense the

node, collects the data and sends the collected data to the base station. It gives the different time slot to the individual node. So, it avoids the simultaneous process. When the estimated delay is larger than the delay constraint, transmission power is increased to reduce the hops of an end-to-end transmission. Since transmission power is increased, the communication range is increased, which indicates that the former neighbors of the sender will still be the one-hop neighbors of the sender, and the sender can have more neighbors due to the increase of communication range. To solve this problem, distributed cluster head scheduling (DCHS) algorithm adjusts the transmission power considering the SINR threshold to enable the successful reception of data packets at receiving node, thus the former connection will not be changed.

The nodes and base station are not mobility and assumed to be stationary. The base station gives first priority to the nearby cluster head because it received a data quickly. The cluster head aggregates the data from all node if the data are same it will send one of the packet. the proposed algorithm reduce the transmission distance and increases the transmission power to reduce the delay

Algorithm

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Input:  no of nodes
 Output: delay constraint
 1. Node creation
 2. Cluster formation
 3. Select the cluster head among the
nodes
4. #finds the number of packets in the
simulation
  If
(packet_id>highest_packet_id#SUM++
5. Packet duration = end - start
If packet duration>0#receivenum++
6. Base station gives higher
priority to nearby CH
7.  Delay = sum/recvnum*1000;
 END
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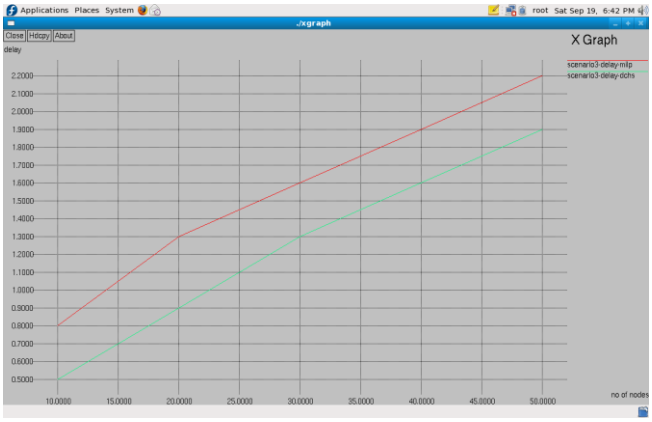

Fig 1: varying no of nodes with delay(s)

Table 1: Delay Constraint

No of nodes	10	20	30	40	50
MILP(s)	0.8	1.3	1.6	1.9	2.2
DCHS(s)	0.5	0.9	1.3	1.6	1.9

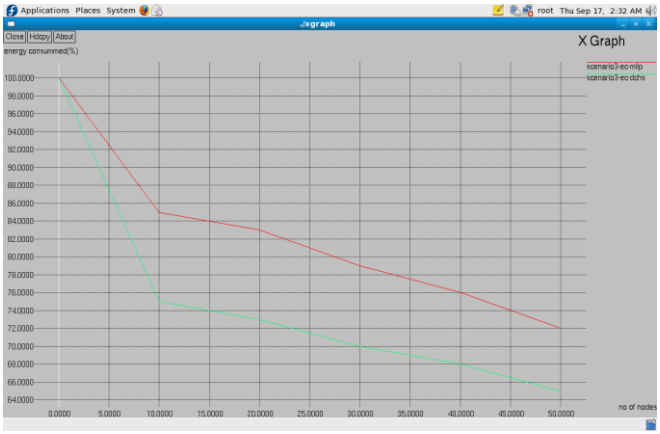

Fig 2: Varying no of nodes with energy consumption (%)

Table 2: Energy Consumption

No of nodes	10	20	30	40	50
MILP (%)	85	83	79	76	72
DCHS (%)	75	73	70	68	65

IV. Simulation Performance

In order to evaluate the performance of the proposed DCHS algorithm, we compare MILP with the energy consumption and delay constrained routing protocol.

In the fig1 represents the number of nodes varying with respect to the delay as compared with MILP optimal formulation. It explained our proposed algorithm is better than the MILP formulation

In the fig 2 represents the minimizing the energy consumption as compared with MILP formulation.

V. Conclusion

In this paper, we propose an interference-based topology control algorithm for delay-constrained mobile ad hoc

networks. The objective of the topology control algorithm is to adjust the transmission power to minimize interference, which is contradictory to the requirement of delay constraint. When transmission power is increased to reduce the delay, which increases the number of neighbors covered by the transmission range and causes more interference from other active nodes in the network. In order to further reduce packet loss and improve the throughput by network management scheme can be incorporated with DCHS algorithm

REFERENCES

[1] S. Cui, A. J. Goldsmith, and A. Bahai, "Energy-constrained modulation optimization," *IEEE Trans. Wireless Commun., vol. 4, no. 5*,pp. 2349–2360, Sep. 2005

[2] .R. A. Leon, V. Vittal, and G. Manimaran, "Application of sensor network for secure electric energy infrastructure," *IEEE Trans .Power Del., vol. 22, no. 2, pp. 1021–1028, Apr. 2007.*

[3] G. S. A. Kumar, G. Manimaran, and Z. Wang, "End-to-end energy management in networked real-time embedded systems," *IEEE Trans. Parallel Distrib. Syst., vol. 19, no. 11, pp. 1498–1510*, Nov. 2008.

[4] C. Yeh, Z. Fan, and R. X. Gao, "Energy-aware data acquisition in wireless sensor networks," in *Proc. IMTC IEEE, Warsaw, Poland*,2007.

[5] P.K.Poonguzhali and V.S.Jayanthi, "A Local Topology Reconfiguration Mechanism To Improve The Energy Efficiency In Wireless Sensor Network," Journal Of Theoretical and Applied Information Technology, Vol.66, no.3, Aug 2014

[6] C. Schurgers, and M. B. Srivastava, "Energy efficient wireless scheduling: adaptive loading in time," *WCNC'02*, March, 2002.rich mobile applications," in *Proc. IEEE GLOBECOM, Washington, DC, USA*, Nov. 2007, pp. 2117–2122.

[7] G. Sharma, R. Mazumdar, and N. B. Shroff, "Delay and capacity trade-offs in mobile ad hoc networks: A global perspective," IEEE/ACM Trans. Netw., vol. 15, no. 5, pp. 981–992, Oct. 2007.

[8] M. Burkhart, P. von Rickenbach, R. Wattenhofer, and A. Zollinger,"Does topology control reduce interference," in Proc. ACM 5th Int.Symp. Mobile Ad Hoc Netw.Comput. 2004, pp. 9–19.

[9] P.K.Poonguzhali and Dr.N.P.AnanthaMoorthy "Performance Comparison of Various Cluster Based Routing Protocols In Wireless Sensor Network," IJAER, Vol. 10, No. 29

[10] P. Nuggehalli, V. Srinivasan, and R. R. Rao, "Delay constrained energy efficient transmission strategies for wireless devices," *INFOCOM'02*,June, 2002.