

Improved Dynamic Cluster Head Election using Wireless Sensor Network

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Abstract: Wireless Sensor Networks (WSN) with a huge number of tiny sensor nodes can be used as an effective tool for gathering data in different situations. cluster based routing protocol were proposed for increasing network lifetime in the WSN. Major issues of cluster-based routing protocol are power consumption and over heading which reduces the overall lifetime and Throughput of the sensor network. In this paper, we introduce dynamic cluster head election mechanism in which each sensor node compares its residual energy, Depending on residual energy the cluster head is selected .in the proposed system multiple level of clustering is done and results are demonstrated using network simulator-2.This simulation increases overall lifetime and throughput compared to single level of clustering .

Keywords: WSNs, cluster head node, energy consumption, residual energy, dynamic cluster head election mechanism, Throughput.

1. Introduction

A Wireless Sensor Network is a transportation comprised of sensing (measuring), computing, and communication elements that gives an ability to instrument, observe, and react to events and phenomena in a specific environment. There are four basic components in a sensor network:

- An assembly of disseminated or localized sensors,
- An interconnecting association (usually, but not always, wireless-based),
- A central point of information clustering, and
- A set of computing resources at the central point (or beyond) to handle data correlation, event trending, status querying, and data mining.

In this paper we use dynamic cluster head node election model that determines energy of each cluster node by considering maximum energy of sensor nodes in each cluster. This reduces energy consumption of WSN. The single level of clustering with residual energy and throughput and lifetime is compared with multi-level of clustering.

2. Dynamic head election mechanism

Cluster head (CH) election is the process to select a node within the cluster as a leader node. Cluster Head maintains the information related to its cluster. This information includes a list of nodes in the cluster and the path to every node. The dependability of the CH is to interact with all the nodes of its

own cluster. The CH must be able to interact with the nodes of other clusters as well, which can be directly or through the respective CH or through gateways. interaction is done in three steps.

- The cluster head receives the data sent by its members
- It compresses the data, and finally transmits the data to the base station or other CH.
- Suitable cluster head can reduce energy utilization and enhances the network lifetime.

3. Super cluster head

The aggregation of clusters forms the number of super cluster head. This super cluster head helps to increase the lifetime of the system. The residual energy of the super cluster head is increased has compared to the single level of clustering. It increases the throughput of the clusters. The graph shows the results.

- Base station is located at the center of the sensor field
- Sensor nodes are energy constrained and have same initial energy.
- All nodes are capable of becoming cluster head.
- Sensor nodes are static.

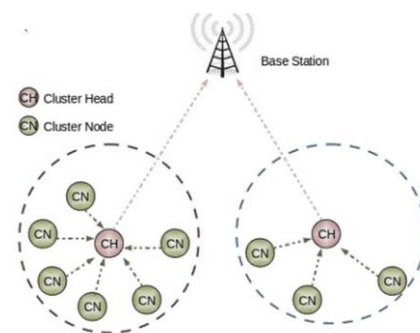


Fig. 1. Base station

4. Literature survey

Chaima Bejaoui, A lexandre Guitton, Abdenaceur Xachouri carried “survey on improved election of cluster heads in leach” this paper proposed protocol that reduces the number of CHS which does not produce isolated nodes. This protocol gave an optimal result for isolated nodes. MS. Sujata Bhadoria, MS.

Lakshmi Nishad, MRS. Lalitha Tongue Carried survey on review of cluster head election mechanisms for clustering based routing in mobile adhoc network. This paper gave best solution for reducing flooding routing packets. Cluster head is selected based on connectivity,mobility,power.

G.vijaya Lakshmi, M.Anto Bennet,P shenbagavalli,S Saranya carried survey on cluster head election mechanism basedon fuzzy logic with TDMA in WSN. The proposed protocol ensures to obtain high efficiency in WSN that makes the protocol more attractive it is useful in many applications like health care, military applications. Result shows the proposed protocol performs better than LEACH protocol.

Harith yalya,Andrew H.Kemp,Yaorob AI Nidawi carried survey on A dynamic cluster head election protocol for mobile wireless sensor networks. Dynamic cluster head election protocol(DCHEP) is used to provide network connectivity. DCHEP is highly scalable and increase performance of dynamic and dense networks.It improves lifetime and availability of network by 26% and 36%.

5. Result

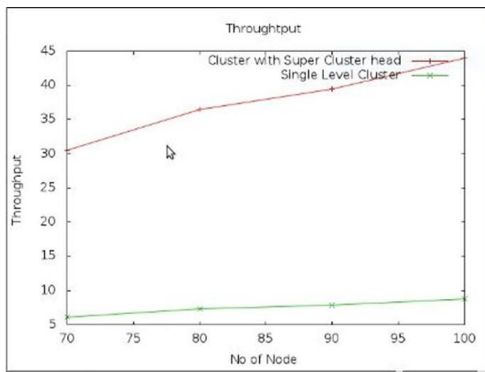


Fig. 2. Throughput

The above graph is drawn between the number of nodes versus throughput. The throughput of the super cluster head is more when compared to the single level of clustering.

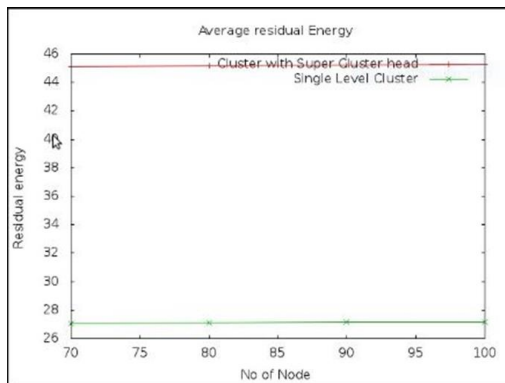


Fig. 3. Average residual energy

The above graph shows the average residual energy of super cluster head is more has compared to single level cluster.

6. Conclusion

The predictable output, Dynamic cluster head node selection (DCHNS) model over WSNs to prolong the network lifetime. We have displayed dynamic election process of cluster head node. The cluster head node is elected on the source of residual energy of sensor nodes. The residual energy is calculated. To establish strength of DCHNE, we have used ns2 simulator that illustrates its performance. On basis of simulation results we believe that the proposed scheme significantly extends the network lifetime and throughput.

References

- [1] Chaima Bejaoui, Alexandre Guitton, and Abdennaceur Kachouri, "Improved election of cluster heads in LEACH," in *International Conference on Computer Systems and Applications (AICCSA)*, 2015, Marrakech, Morocco. International Conference on Computer Systems and Applications (AICCSA), pp.1- 4, 2015.
- [2] Sujata Bhadoria, Lakshmi Nishad, and Lalitha Tongue, "Review on cluster head election mechanisms," in *International Journal of Scientific and Research Publications*, vol. 4, no. 7, pp. 1-3, July 2014
- [3] H. Yahya, Y. Al-Nidawi and A. H. Kemp, "A dynamic cluster head election protocol for mobile wireless sensor networks," *2015 International Symposium on Wireless Communication Systems (ISWCS)*, Brussels, 2015, pp. 356-360.
- [4] J. Zhang, Q. Wu, F. Ren, T. He and C. Lin, "Effective Data Aggregation Supported by Dynamic Routing in Wireless Sensor Networks," *2010 IEEE International Conference on Communications*, Cape Town, 2010, pp. 1-6.
- [5] F. Cheng-xu, et al., "An energy-efficient clustering algorithm for wireless sensor networks".
- [6] F. Cheng-xu, L. Zhong, L. Zhi-kun and Fang Biao, "An Energy-Efficient Clustering Algorithm for Wireless Sensor Networks," in *Proceedings of the 2nd International Conference on Computer Science and Electronics Engineering (ICCSEE 2013)*, pp. 1106-1109, 2013.
- [7] J. Baek, Sun Kyong An, P. S. Fisher and E. J. Jones, "Dynamic cluster header selection with self-incentive for wireless sensor networks," *2009 IEEE Sarnoff Symposium*, Princeton, NJ, 2009, pp. 1-5.
- [8] G Vijayalakshmi, M. Anto Bennet, P. Shenbagavalli, and S. Saranya "Cluster head election mechanism based on fuzzy logic with TDMA in WSN," in *International journal on smart sensing and intelligent systems Special Issue*, pp. 395-413, September 2017.