ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 2, Issue 11, November 2014

Review on DRINA: A Lightweight and Reliable Routing Approach for In-Network Aggregation in Wireless Sensor Networks

Harshada Bhosale, Shubham Joshi

M.E. Student, Dept. of C.E., D.P.C.O.E. Wagholi, Pune, Maharashtra, India

Assistant Professor, Dept. of C.E., D.P.C.O.E. Wagholi, Pune, Maharashtra, India

ABSTRACT: A wireless sensor network is a collection of distributed nodes to monitor physical or environmental conditions like sound, temperature at different locations as well as to pass their data through network to a sink node. Sensor nodes in wireless sensor network are nearly located and communicating with each other through routing. Data routing takes place in non-aggregated manner should consume more energy in wireless sensor network. Energy conservation is the major issue in wireless sensor network. To save this energy consumption, data aggregation can be effective in routing. This data aggregation is used for increasing data accuracy, eliminating data redundancy, reducing communication load along with saving energy consumption. In network aggregation along with lightweight reliable routing scheme can be invoked to schematize & increase the probability of occurrence of security & reliable communication in & around network.

KEYWORDS: Data aggregation, in-network aggregation, cluster, routing, communication

I. INTRODUCTION

A Wireless Sensor Network (WSN) consists of sensor nodes that monitor physical or environmental conditions, such as temperature, sound, vibration, pressure, motion, or pollutants [2],[3]. WSNs are used in applications such as environmental monitoring, homeland security, critical infrastructure systems, communications, manufacturing military and many other applications that can be critical to save lives and assets[4]. Sensor nodes are energy-constrained devices and the energy consumption is generally associated with the amount of gathered data, since communication is often the most expensive activity in terms of energy. For that reason, algorithms and protocols designed for WSNs should consider the energy consumption in their conception. Moreover, WSNs are data-driven networks that usually produce a large amount of information that needs to be routed, often in a multihop fashion, toward a sink node, which works as a gateway to a monitoring center. Routing plays an important role in the data gathering process.

A possible strategy to optimize the routing task is to use the available processing capacity provided by the intermediate sensor nodes along the routing paths. This is known as data-centric routing or in-network data aggregation.

Nodes are energy-constrained devices and the energy consumption is generally associated with the amount of gathered data, since communication is often the most expensive activity in terms of energy. For that reason, algorithms and protocols designed for WSNs should consider the energy consumption in their conception. Moreover, WSNs are data-driven networks that usually produce a large amount of information that needs to be routed, often in a multihop fashion, toward a sink node. Given this scenario, routing plays an important role in the Data gathering process.

Thus, various algorithms have been proposed to provide data aggregation during the routing in WSNs. Some of them are tree-based algorithms and try to solve some variation of the Steiner tree problem; others are cluster-based algorithms while others are simply structure-less.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 2, Issue 11, November 2014

II. LITERATURE SURVEY

Various algorithms have been proposed to provide data aggregation during the routing in WSNs. Some of them are tree-based algorithms, cluster-based algorithms while others are simply structure-less algorithms [2].
IN-NETWORK DATA AGGREGATION - A key component for in-network data aggregation is the design of a data aggregation aware routing protocol. Data aggregation requires a forwarding paradigm that is different from the classic routing. A key aspect of in-network data aggregation is the synchronization of data transmission among the nodes.
In these algorithms, a node usually does not send data as soon as it is available since waiting for data from neighbouring nodes may lead to better data aggregation opportunities.

This in turn, will improve the performance of the algorithm and save energy. Three main timing strategies are found in the literature. Those are Periodic simple aggregation, Periodic per-hop aggregation, Periodic per-hop adjusted aggregation.

In-network data aggregation plays an important role in energy constrained WSNs since data correlation is exploited and aggregation is performed at intermediate nodes reducing size and the number of messages exchanged across the network. In data gathering-based applications, a considerable number of communication packets can be reduced by in-network aggregation, resulting in a longer network lifetime.
In most cases, tree-based protocols build a traditional shortest path routing tree. For instance, the Shortest Path Tree (SPT) algorithm [9] uses a very simple strategy to build a routing tree in a distributed fashion. In this approach, every node that detects an event reports its collected information by using a shortest path to the sink node. Information fusion occurs whenever paths overlap.

Similarly to the tree-based approaches, cluster-based schemes [10], [11] also consist of a hierarchical Organization of the network. However, in these approaches, nodes are divided into clusters. Moreover, special nodes, referred to as cluster-heads, are elected to aggregate data locally and forward the result of such aggregation to the sink node.

In the Low-Energy Adaptive Clustering Hierarchy (LEACH) algorithm [11], clustered structures are exploited to perform data aggregation. In this algorithm, clusterheads can act as aggregation points and they communicate directly to the sink node. In order to evenly distribute energy consumption among all nodes, cluster-heads are randomly elected in each round. LEACH-based algorithms assume that the sink can be reached by any node in only one hop, which limits the size of the network for which such protocols can be used. The Information Fusion-based Role Assignment (InFRA) algorithm [10]builds a cluster for each event including only those nodes that were able to detect it. Then, cluster-heads merge the data within the cluster and send the result toward the sink node. The InFRA algorithm aims at building the shortest path tree that maximizes information fusion. Thus, once clusters are formed, cluster-heads choose the shortest path to the sink node that also maximizes information fusion by using the aggregated coordinatorsdistance [10]. A disadvantage of the InFRA algorithm is that for each new event that arises in the network, the information about the event must be flooded throughout the network to inform other nodes about its occurrence and to update the aggregated coordinators-distance. This procedure increases the communication cost of the algorithm and, thus, limits its scalability.

III. CONCLUSION

WSNs are data-driven networks that usually produce a large amount of information that needs to be routed, often in a multihop fashion, toward a sink node, which works as a gateway to a monitoring centre.To define and address various issues in routing, to gather data and also to add preventive measures this routing plays an important role.

ACKNOWLEDGEMENTS

Sincere thanks to the reviewers for reviewing this manuscript and providing inputs for greatly improving the quality of this paper.

ISSN(Online): 2320-9801
ISSN (Print): 2320-9798

International Journal of Innovative Research in Computer and Communication Engineering

(An ISO 3297: 2007 Certified Organization)

Vol. 2, Issue 11, November 2014

REFERENCES

1. Harshada A. Bhosale, "Review on DRINA: A Lightweight and Reliable Routing Approach for In-Network Aggregation in Wireless Sensor Networks",International Journal of Emerging Trends & Technology in computer Science, Vol.2,Issue 11, 2014.
2. Leandro Aparecido Villas, AzzedineBoukerche, HeitorSoaresRamos,Horacio A.B. Fernandes de Oliveira, Regina Borges de Araujo, and Antonio Alfredo Ferreira Loureiro, "DRINA: A Lightweight and Reliable Routing Approach for In-Network Aggregation in Wireless Sensor Networks", 2013.
3. I.F. Akyildiz, W. Su, Y. Sankarasubramaniam, and E. Cyirci, "Wireless Sensor Networks: A Survey," Computer Networks, vol. 38, no. 4, pp. 393-422, Mar. 2002.
4. K. Romer and F. Mattern, "The Design Space of Wireless Sensor Networks," IEEE Wireless Comm., vol. 11, no. 6, pp. 54-61, Dec. 2004.
5. G. Anastasi, M. Conti, M. Francesco, and A. Passarella, "Energy Conservation in Wireless Sensor Networks: A Survey," Ad Hoc Networks, vol. 7, no. 3, pp. 537- 568, http://dx.doi.org/10.1016/j.adhoc.2008.06.003, May 2009.
6. L. Villas, A. Boukerche, R.B. de Araujo, and A.A.F. Loureiro, "Highly Dynamic Routing Protocol for Data Aggregation in
7. Sensor Networks," Proc. IEEE Symp. Computers and Comm. (ISCC), pp. 496-502, http://dx.doi.org/10.1109/ISCC.2010.5546580, 2010.
8. L.A. Villas, A. Boukerche, H.A. de Oliveira, R.B. de Araujo, and A.A. Loureiro, "A Spatial Correlation Aware Algorithm to Perform Efficient Data Collection in Wireless Sensor Networks," Ad Hoc Networks, http://www.sciencedirect.com/science/ article/pii/S1570870511001892, 2011.
9. F. Hu, X. Cao, and C. May, "Optimized Scheduling for Data Aggregation in Wireless Sensor Networks," Proc. Int'l Conf.
10. Information Technology: Coding and Computing (ITCC '05), pp. 557- 561, 2005.
11. B. Krishnamachari, D. Estrin, and S.B. Wicker, "The Impact of Data Aggregation in Wireless Sensor Networks," Proc. 22nd Int'l Conf. Distributed Computing Systems (ICDCSW '02), pp. 575-578, 2002.
12. E.F. Nakamura, H.A.B.F. de Oliveira, L.F. Pontello, and A.A.F. Loureiro, "On Demand Role Assignment for Event-Detection in Sensor Networks," Proc. IEEE 11th Symp. Computers and Comm. (ISCC '06), pp. 941-947, 2006.
13. A.P. Chandrakasan, A.C. Smith, and W.B. Heinzelman, "An Application-Specific Protocol Architecture for Wireless Microsensor Networks," IEEE Trans. Wireless Comm., vol. 1, no. 4, pp. 660- 670, Oct. 2002.

BIOGRAPHY

Harshada Arvind Bhosale is a M.E. student in the Computer Engineering Department, Dhole Patil College of Engineering, Pune University. She received Bachelor degree in Computer Science and Engineering stream (B.E.-C.S.E.) in 2013 from Pune, Maharashtra, India. Her research interests are Mobile Ad Hoc Networks, Algorithms etc.