Asian Journal of Applied Science and Technology (AJAST)
Volume 1, Issue 3, Pages 20-22, April 2017

Advanced Energy Aware Opportunistic Routing (EAOR) Algorithm for Node Selection in 1-D Queue Networks

S.Indiradevi[1] and E.Senthamil Pavaai[2]

[1]*UG Scholar, Department of Electronics and Communication Engineering, IFET College of Engineering, Villupuram, India.*
[2]*Assistant Professor, Department of Electronics and Communication Engineering, IFET College of Engineering, Villupuram, India.*

Article Received: 20 March 2017 *Article Accepted: 29 March 2017* *Article Published: 01 April 2017*

ABSTRACT

In wireless sensor networks (WSN) the energy saving optimization that plays an important concern during the designing of routing protocol, because of these the many of the sensor nodes are made with the limited non rechargeable battery power. The relay node selection is the important drawback in every routing protocol. This paper is used to minimize the energy consumption and maximizing the network lifetime in one dimensional (1-D) queue network by the principle of opportunistic routing theory and the node selection is easier in this proposed system. In the paper we use the Advanced Energy Aware Opportunistic Routing (EAOR) is designed to achieve the minimum power consumption and improve the lifetime of the network in the wireless sensor networks. The Advanced Energy Aware Opportunistic Routing can significantly improve the network performance and efficiency during the data relay.

Keywords: One dimension (1-D) queue network, Opportunistic routing, Advanced energy aware routing (EAOR) and Network performance.

1. INTRODUCTION

The wireless sensor networks (WSNs) are widely used in medical cares, inhospitable terrains and agricultural survey. By achieving improvement of cost effective and low power and poly functional wireless sensor nodes by using effective wireless communication and advancement of electronics. The important task of sensor nodes is to gather the data and transmitting data through transmitter during the supervision of physical or environmental conditions. Comparatively the power consumption is high during the transmission of data than collection of data. To enhance the energy efficiency for sending data, maximum number of conventional energy efficient routing protocols are try to establish the minimum energy path between the source and destination for achieving a low power consumption. Not only for power consumption but also for maintaining residual energy during distribution in the wireless sensor networks. Due to the unreliable network packet loss are occurs, the loss packets can be transmitted in multiple time means then the losses can be avoided. Hence it is necessary to make a network with minimum power consumption and maximum network lifetime.

In this paper we focus on one dimensional (1-D) queue networks, it can be designed for various applications such as industrial and civilian applications, for the purpose of pipeline monitoring, power line monitoring and intelligent traffic control. The one dimensional queue is designed with linear network deployment structure. The deployment means that the network is designed without any causes to environment.

In this paper, we propose an Advanced Energy Aware Opportunistic Routing (Advanced EAOR) in one dimensional queue networks. The reason for using this algorithm is the energy can be saved and lifetime of the network is maximized. Sensor nodes are usually static in nature, and each are belonging only to the same information. The information is about the source node and sink node distance, and also a residual energy of each node. The distance measurement is the important for optimal transmission, is the important factor of measurement in opportunistic routing. Our aim is to improve the energy efficiency and improving the lifetime of networks.

2. RELATED WORK

Some of energy efficient methods are invented in literature [1]-[3]. When compared to the sensor node the transmitted node consumes high power, for that purpose the finding of minimum path between the transmitting and receiving node is important. In [1], the optimal forwarding distance of every single hop and optimal power control can be analyzed theoretically. There is a compromise between using long hop length and high power and using shorter hop length and low power length. For this energy consumption can be minimized. In 1-D queue network the Most Forwarded within Range (MFR) routing method can be assumed for analysis, which is easy to select the node as the farthest neighboring node as the next forwarder, which leads to less delay and low level of energy consumption. The alternate way to reduce the power consumption by two ways (i.e.) bit allocation and short distance selection [3] (path selection).

The opportunistic routing concept can be proposed to overcome the problem in wireless links (unreliable wireless links) routing in wireless networks [4]. The EXOR is the best geographic random forwarding when compared to the traditional routing protocol [5]. The analysis of various opportunistic routing such as EXOR (Extremely Opportunistic Routing), EEOR (Energy Efficient Opportunistic Routing), SAOR (Simple Adaptive Opportunistic Routing), EAOR (Energy Aware Opportunistic Routing)[6] are used for energy saving of sink node in WSNs.

3. NETWORK AND ENERGY MODELS

3.1 Network Models

Let us take a multihop WSN in 1-D queue network in Fig.1. The nodes are having the capacity to know the information of their neighboring nodes and their placing of source node and sink node. Each wireless sensor network has a large transmission range denoted as R and minimum distance dmim.

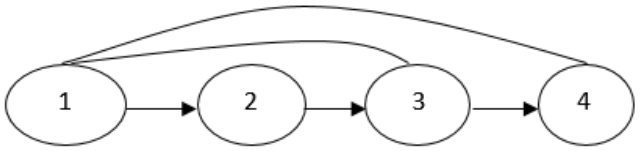

Fig.1. Sample Node Transfer in Network

3.2 Energy Model

A simple energy node of radio communication is used in [7] and [8]. The consumption of energy is expressed as,

$$E_T = (E_{elec} + E_n\, d^t)B$$

Where E_{elec} is basic energy consumption, E_n is energy dissipation of transmitted node, d is the transmitter-receiver distance, t is path loss of channel. E_t transmitted energy consumption in message at distance d.

4. EXTREMELY OPPORTUNISTIC ROUTING ALGORITHM (EXOR)

Let take an example as simple network shown in fig 1. The node 1 is the starting node and node 4 is the ending node. The neighboring nodes 2 and 3 is delivery the packets to node 4 is efficient way, the node 3 will receive the packet from node 2 will make a few of forward movement in the exact direction and it leads to high level of efficient reception, because of this there is a various possibility of receiving a packets that send from node 1 and received by node 2 and 3. The most EXOR mechanism are not on this action of above example, from the initial transmission, the nodes are sending acknowledgement based on the priority. The main drawback of the EXOR routing is the relay node selection. To overcome this Advanced Energy Aware Opportunistic Routing is implemented.

5. ADVANCED ENERGY OPPORTUNISTIC ROUTING (Advanced EAOR)

The main aim of this protocol is follows. An Advanced EAOR protocol for routing request with a particular end-to-end delay restrictions is proposed, which helps to balancing between the energy consumption and network lifetime, the Advanced Energy Aware Opportunistic Routing is similar to Opportunistic Routing but the main contrast of Advanced EAOR is the next intermediate node selection. The sensor node evaluating the levels of energy in Advanced EAOR routing of different Request to Send (RTS) the energy level becomes low means then it will not respond to Clear to Send (CTS) by these way the lifetime of node becomes greater. This routing is attempts to transmit a packet to the node which is near to the destination. The path used in the routing is not always a similar path and similar number of hops.

In the project the energy can be saved by putting the node to sleep mode which are all not involved in the actions of either transmission or reception, due to this the unwanted power consumption can be avoided and lifetime of the network is improved.

6. SIMULATION RESULTS

We lead the simulation experiments using MATLAB. In this section we compare the lifetime performance of the EXOR and Advanced EAOR routing (fig 3). These figure shows that the lifetime of the Advanced EAOR is higher than the EXOR lifetime by conducting two iterations.

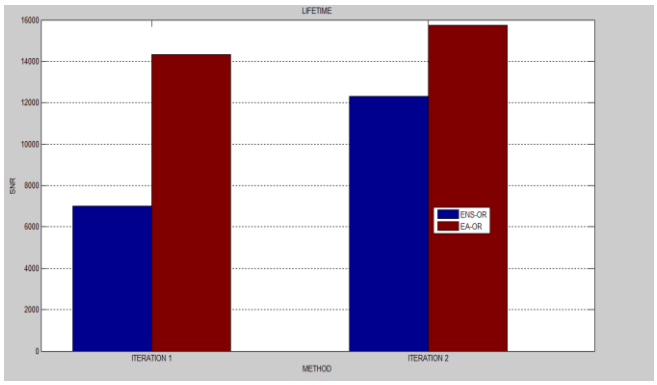

Fig.2. Network Lifetime Comparison

Next we determine the energy efficiency of the EXOR and Advanced EAOR routing by using SNR (signal to noise ratio) and energy relations.

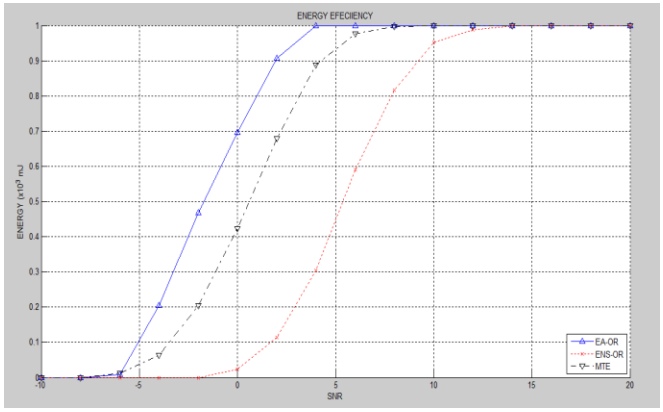

Fig.3. Energy Efficiency

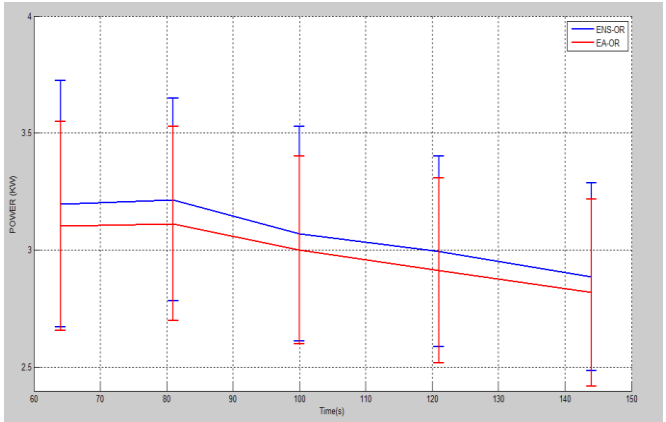

Fig.4. Power Consumption

Next the power consumption graph is shown (fig.4) that shows the power consumption variations between the two routing protocols Advanced EAOR and EXOR. The comparison is done by plotting the graph between power vs time.

7. CONCLUSION

In this paper, we concentrated on to minimize energy consumption and maximizing the lifetime of network in 1-D queue networks by using the algorithm of Advanced Energy Aware Opportunistic Routing for relay node selection. By using this algorithm the lifetime of the network is improved and energy consumption during the transmission is reduced by using the Advanced EAOR routing algorithm. The simulation results show the energy consumption of Advanced EAOR is lesser than conventional ExOR. And lifetime of Advanced EAOR is higher than the ExOR routing algorithm.

REFERENCES

[1] V. Ramaiyan, A. Kumar, and E. Altman, "Optimal hop distance and power control for a single cell, dense, ad hoc wireless network", *IEEE Trans. Mobile Comput.*, vol. 11, no. 11, pp. 1601–1612, Nov. 2012.

[2] S. Dulman, M. Rossi, P. Havinga, and M. Zorzi, "On the hop count statistics for randomly deployed wireless sensor networks", *Int. J. Sensor Netw.*, vol. 1, no. 1, pp. 89–102, 2012.

[3] Y. Keshtkarjahromi, R. Ansari, and A.Khokhar, "Energy efficient decentralized detection based on bit-optimal multi-hop transmission in one-dimensional wireless sensor networks," *in Proc. Int. Fed. Inf. Process. Wireless Days (WD),* 2011.

[4] H. Liu, B. Zhang, H. T. Mouftah, X. Shen, and J. Ma, "Opportunistic routing for wireless ad hoc and sensor networks: Present and future directions," *IEEE Commun. Mag.*, vol. 47, no. 12, pp. 103–109, Dec. 2011.

[5] H. Liu, B. Zhang, H. T. Mouftah, X. Shen, and J. Ma, "Opportunistic routing for wireless ad hoc and sensor networks: Present and future directions," *IEEE Commun. Mag.*, vol. 47, no. 12, pp. 103–109, Dec. 2009.

[6] S. Biswas and R. Morris, "Exor: Opportunistic multi-hop routing for wireless networks," in *Assoc. Comput. Mach. SIGCOMM Comput. Commun. Rev.*, 2005, vol. 35, no. 4, pp. 133–144.

[7] M. Bhardwaj, T. Garnett, and A. P. Chandrakasan, "Upper bounds on the lifetime of sensor networks," *in Proc. IEEE Int. Conf. Commun. (ICC'01),* 2001, vol. 3, pp. 785–790.

[8] R. Min, M. Bhardwaj, N. Ickes, A. Wang, and A. Chandrakasan, "The hardware and the network: Total-system strategies", *IEEE CAS Workshop Wireless Commun. Netw., Pasadena, CA, USA,* 2002, pp. 36–12.