ISSN: 2321-8169
130 – 133

Collaborative Approach for Improving the Scheduling and Providing Advanced Security in Wireless Sensor Network

Ms. Sonu Mohadikar
ME in Wireless Communication and Computing
JDCOEM, Nagpur
RTMNU, Nagpur, India
kamble.rucha3@gmail.com

Prof. M.M Baig
ME in Wireless Communication and Computing
JDCOEM, Nagpur
RTMNU, Nagpur, India
mirzammb@gmail.com

Abstract— Recent advances in Wireless Sensor Networks (WSN) have focused towards Geographic forwarding mechanism. It is a promising routing scheme in wireless sensor networks, in which the forwarding decision is determined purely based on the location of each node. Such type of Routing in Geographic domain is also useful for large multi-hop wireless networks where the nodes are not reliable and network topology is frequently changing. This routing requires propagation of single hop topology information that is the best neighbor, to make correct forwarding decisions.

The research of Geographic routing has now moved towards duty cycled wireless sensor networks (WSNs). In such type of network, sensors are sleep scheduled which helps in reduction of energy consumption. It works by dynamically putting the nodes to sleep when not in use and reactivate it, when required, by using some sleep scheduling algorithms. Geographic routing is usually based on distance which is considered as its main parameter. This routing uses geographic routing oriented sleep scheduling (GSS) algorithm & geographic-distance-based connected-k neighborhood (GCKN) algorithm.

The existing research was done to find out the shortest path from source to destination in Duty-Cycled Mobile sensor networks along with geographic routing, using distance as a parameter. But there may be the case when shortest path is available and the nodes are heavily loaded. Therefore, load balancing also proves to be equally important factor. Hence, this research work proposes the system that will calculate the best optimal path from source node to destination by taking into consideration the load on each node and delay incurred by each node in Duty-Cycled Mobile sensor networks along with geographic routing.

The experimental results and performance analysis shows that the newly proposed approach achieves the best results in comparison with the existing system.
.

General Terms: *Wireless Sensor Network, Path Finding, Load Balancing*

*****

I. INTRODUCTION

Recent study shows that Geographic routing is the most important routing in wireless sensor networks (WSNs). It serves with simplicity, scalability, and efficiency. This routing principle relies on geographic position information. To improve the efficiency of route search towards destination, location information is used.

Routing in Geographic domain is also useful for large multi-hop wireless networks where the nodes are not reliable and network topology is frequently changing. This type of routing requires propagation of single hop topology information that is the best neighbor, to make correct forwarding decisions [1].

The efficiency of this scheme is decided by Network density, accurate localization of nodes and the forwarding rule.

Some advantages of Geographic Routing are as follows:

- High mobility support decides the system efficiency. Each node sends its data to its coordinates periodically and all its neighbors update their routing tables accordingly. Thus all nodes are aware of its alive neighbor nodes.

- Scalability- It is also an important factor for geographic routing. The size of routing table depends on network density and not on network population. Hence, wider network with large number of nodes can be used without cluster formation.

- Minimum overheads- All the interaction in the network are localized. This results in bandwidth minimization. It saves processing and transmission of energy and reduces routing table dimension. Instead of using the network address, a message is sent to the geographic location of destination by the source. The determination of routing path from source to destination is by forwarding the selected node at each intermediate node in a fully-distributed manner. Thus the forwarding decision is determined purely on the basis of the location of each node instead of the network size.

The research of Geographic routing has now moved towards duty cycled wireless sensor networks (WSNs). Duty Cycled WSN aims at reduction in use of power consumption. According to some sleep scheduling algorithm, some nodes are made to sleep and awake alternately. It selects a specific node while the other nodes

ISSN: 2321-8169
130 – 133

in the network are inactive. Thus it leads to lesser power consumption.

II. LITERATURE SURVEY

According to the taxonomy presented by Chunsheng Zhu, Laurence T. Yang, Lei Shu, Joel J. P. C. Rodrigues and Takahiro Hara in [2], a geographic routing oriented sleep scheduling (GSS) is proposed in order to deal with the latency issue imposed by duty cycling on geographic routing. The author examined the working of first transmission path of the two-phase geographic forwarding (TPGF) in a CKN based WSN and proposed a geographic routing oriented sleep scheduling (GSS) algorithm to reduce the first transmission path of TPGF in duty-cycled WSNs. TPGF can be executed repeatedly to find multiple paths and nodes in any path explored by TPGF cannot be reused, which makes the first transmission path of TPGF have access to all neighbor nodes thus tend to be the shortest and most likely utilized path compared with other paths. As geographic routing is moving towards sensor networks with duty-cycle, it can be used to save energy consumption which is a very important design factor in practical WSN application scenarios.

In [3] Can Ma1, Lei Wang1, Jiaqi Xu1, Zhenquan Qin1, Ming Zhu1, Lei Shu discussed about topology coverage problem. The paper, focus on achieving better energy conservation for geographic routing algorithms in duty-cycled

WSNs when there is a mobile sink. Thus, the author proposed a multi-metric geographic algorithm (MMGR) which uses multi-metric candidates (MMCs) for geographic routing. However existing researches is either concern with duty-cycle or with mobile sinks, but MMGR considers the both aspects in geographic routing, for energy conservation.

The author Chunsheng Zhu, Laurence T. Yang, Lei Shu, Victor C. M. Leung, Joel J. P. C. Rodrigues and Lei Wang in[4] have explored geographic routing in duty-cycled mobile WSNs. They proposed two Geographic-distance-based Connected-k Neighbourhood (GCKN) sleep scheduling algorithms for geographic routing schemes to be applied into duty-cycled mobile WSNs. It can include the advantage of sleep scheduling and mobility. The first geographic-distance-based connected-k neighbourhood for first path (GCKNF) sleep scheduling algorithm minimizes the length of first transmission path explored by geographic routing in duty-cycled mobile WSNs and the second geographic-distance based connected-k neighbourhood for all paths (GCKNA) sleep scheduling algorithm reduces the length of all paths searched by geographic routing in duty-cycled mobile WSNs. Both the algorithms are very effective in shortening the length of the transmission path explored by geographic routing in duty-cycled mobile WSNs compared with the CKN sleep scheduling algorithm and the GSS algorithm. Sleep scheduling is a worthy research direction to adapt geographic forwarding methods into duty-cycled mobile WSNs. It will also be helpful in finding the optimal path in the proposed system.

OBJECTIVE

The main objective of this work focuses on -

- Determining the best optimal paths from source to destination by consideration the load and delay on each node.
- Reducing end to end delay
- Ensuring the better packet delivery.
- Improving the network efficiency.

III. SIMULATION OUTCOMES

EXPERIMENTAL SET UP

To evaluate the performance of the proposed system, while applying geographic routing into duty cycled mobile WSNs, an extensive stimulation using Network stimulator 2.35 is performed. The simulation parameter is shown in Table below.

PARAMETERS	VALUES
Routing Protocol	DSR
Simulation Time	50 Seconds
Number Of Nodes	50
Simulation Area (M X M)	1350 X 1130
Traffic Type	CBR
Performance Parameter	Throughput, Delay, Pdr,
Pause Time	0.2 Seconds
Packet Size (Bits)	512
Date Rate (Mbps)	512 Kbps
Scheduling	TDMA
Queue Model	Priority Queue
MAC	802.11, 802.16
Channel Type	Wireless Channel
Antenna Type	Omni Antenna
Mobility Type	Random Walk

Table1 Stimulation Parameters

For the network set up, a set of 50 nodes from N0 to N49 is considered. These 50 nodes are in a grid structure along with the object and the Base station is situated at the center of the grid. Here the object is mobile while the other nodes are considered as stationary. Initially, a connection is set up by sending hello packets to the neighboring nodes. It checks whether the neighboring node is in sleep state or active state. Thus, it provides a comparative analysis of existing system with respect to proposed system.

stimulation

Network Simulator 2 is used for simulation. The fig 1 shows the sample screenshot (network animator - nam) while running the program in ns2. The nam window shows the delivery of data from source to destination. The version used is ns-2.31.

ISSN: 2321-8169
130 – 133

Simulation is done using 50 nodes in the network. Simulation is performed in wireless environment.

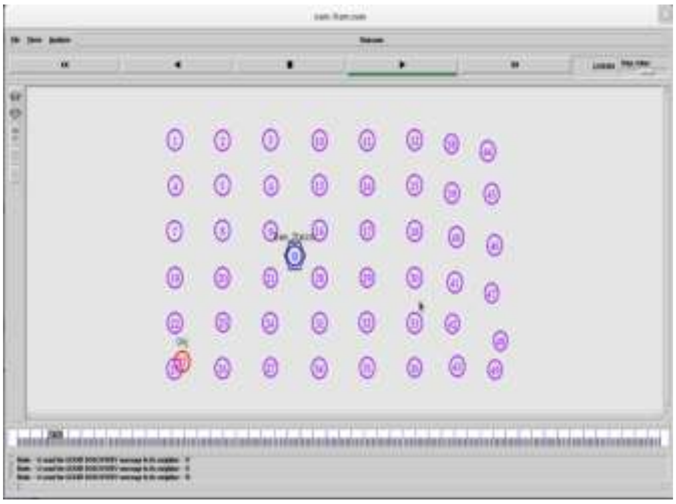

Figure1Screenshot of NAM in ns2.35- Screen 1

The above NAM screen shows a grid of 50 nodes and a base station. The object is shown in red color near the source. Here, the object is mobile and rest of the node is stationary.

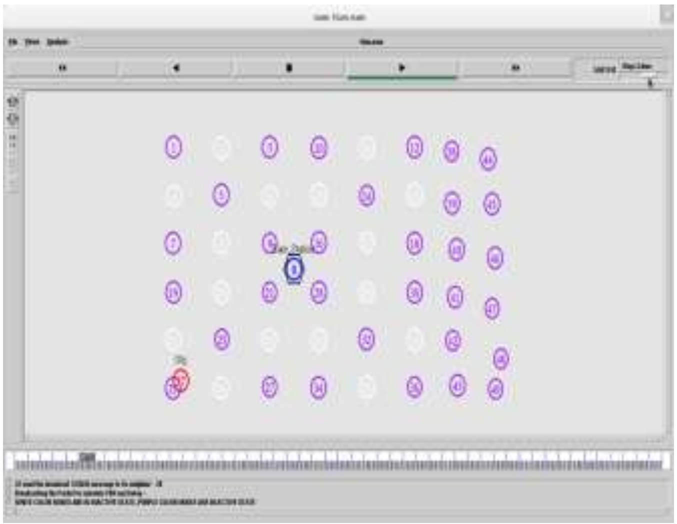

Figure2. Screenshot of NAM in ns2.35-Screen 2

In the above figure2 Initially GCKN message is sent to all the node to find out whether the nodes are in sleep state or awake state. By using sleep scheduling, the nodes which are not in use is made to sleep and thus conserving the energy of network.

IV. RESULTS AND CONCLUSIONS

The fig 3 shows the improvement of throughput with respect to time in proposed system over existing system. X-axis indicates stimulation time and y-axis indicates throughput values. With the increase in time the throughput of the network also increases simultaneously. The graphical analysis shows that the proposed system is more efficient than the existing system.

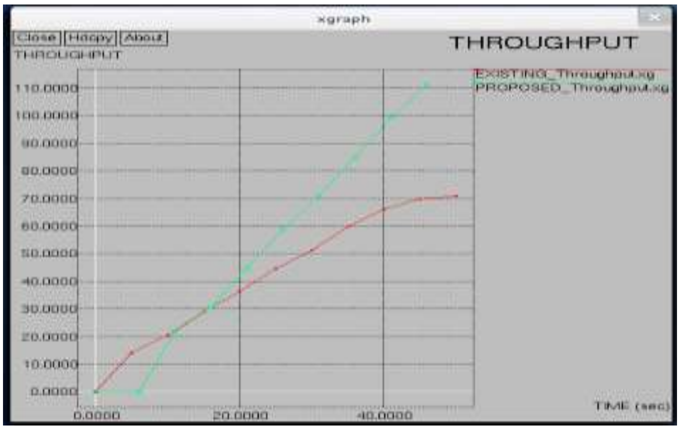

Figure 3. Throughput vs. time Graph Screen

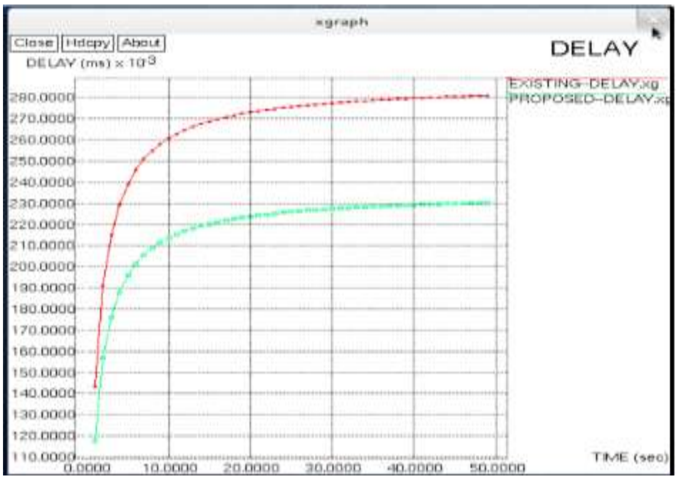

Figure 4.Comparison Graph Screen

The above graph shows comparison between the existing system and proposed system using Delay as a parameter where X-axis indicates stimulation time and Y-axis indicates delay values. These values are calculated by using formula *sending time- receiving time*. The graphical analysis shows delay incurred in existing system is more than the proposed system.

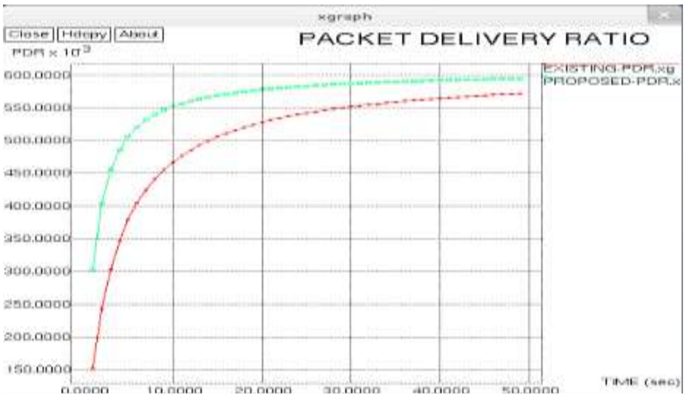

Figure 5 Comparison Graph Screen

The above graph indicates improvement in PDR of proposed system with the existing system with respect to time. X-axis indicates stimulation time and Y-axis indicates PDR values. If the nodes are heavily loaded then its PDR will be less and vice versa. The graphical analysis shows that the proposed system has higher PDR than the existing system.

V. CONCLUSION AND FUTURE SCOPE

From performance analysis and experimental result the following conclusions and recommendation are drawn:
This work focuses on finding optimal path in wireless sensor network with consideration of load and delay at every node. ns-2.35 is used for the optimal path calculations. The shortest path found by using distance as a parameter may result in delay, as the nodes along the path may be heavily loaded. Hence only distance parameter is not sufficient and thus we understand the motivation behind load consideration.

Throughput, Delay and PDR are important QoSparameter.slight increase or decrease in these parameter may affect network performance. Our simulation result shows considerable improvement over existing system, that takes distance as a parameter for optimal path finding.

From the simulation results we can conclude that load and delay for optimal path finding, improves network performance.

Improvement in other network parameter can be worked out as the future enhancement of this work. This will improve the network performance.

REFERENCES

[1] Kakaziz,p; Liliguo, H.C; Zahariadis, T; Orphanoudakis, T" Geographical routing in Wireless sensor networks" International conference on Telecommunications and Multimedia (TEMU), Pages 19-24, 2012.

[2] Chunsheng Zhu, Laurence T. Yang, Lei Shu†, Joel J. P. C. Rodrigues‡, Takahiro Hara "A Geographic Routing Oriented Sleep Scheduling Algorithm in Duty-Cycled Sensor Networks " in IEEE ICC 2012 - Wireless Networks Symposium.

[3] Can Ma1, Lei Wang1, Jiaqi Xu1, Zhenquan Qin1, Ming Zhu1, Lei Shu2 "A Geographic Routing Algorithm in Duty-Cycled Sensor Networks with Mobile Sinks" in 2011 IEEE Seventh International Conference on Mobile Ad-hoc and Sensor Networks

[4] Chunsheng Zhu, Laurence T. Yang, Lei Shu, Victor C. M. Leung, Joel J. P. C. Rodrigues, and Lei Wang, "Sleep Scheduling for Geographic Routing in Duty-Cycled Mobile Sensor Networks" in IEEE TRANSACTIONS ON INDUSTRIAL ELECTRONICS, VOL. 61, NO. 11, NOVEMBER 2014

[5] Pedro Pinto, António Pinto, Manuel Ricardo in "End-to-End Delay Estimation using RPL Metrics in WSN" 978-1-4799-0543-0/13/$31.00 ©2013 IEEE

[6] BiJun Li, MinJungBaek, SeUngHyeon, and Ki-Il Kim" Load Balancing Parameters for Geographic Routing Protocol in Wireless Sensor Networks" in 978-1-4244-7618-3 /10/$26.00 ©2010 IEEE

[7] Cheng Guo, Jinglong Zhou, PrzemysławPawełczak and RaminHekmat "Improving Packet Delivery Ratio Estimation for Indoor Ad Hoc and Wireless Sensor Networks" in 978-1-4244-2309-5/09/$25.00 ©2009 IEEE

[8] Xinyu Zhang and Kang G. Shin in " Delay-Optimal Broadcast for Multihop Wireless Networks Using Self-Interference Cancellation" IEEE TRANSACTIONS ON MOBILE COMPUTING, VOL. 12, NO. 1, JANUARY 2013

[9] DipakWajgi and Dr. Nileshsingh V. Thakur in " Load Balancing Algorithms in Wireless Sensor Network : A Survey" International Journal of Computer Networks and Wireless Communications (IJCNWC), ISSN: 2250-3501 , Vol.2, No4, August 2012

[10] JieGao, Member, IEEE, and Li Zhang in "Load-Balanced Short-Path Routing" IEEE Transaction on Parallel and Distributed Systems, Vol.17, No.4, April 2006.