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. 3, Issue 5, May 2015

A Geographic Routing Oriented Sleep Scheduling Algorithm in Duty-Cycled Mobile Sensor Networks

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ABSTRACT: Newly, the research center on geographic routing, a capable routing scheme in wireless (Mobile) sensor networks (WSNs), is changing in the direction of duty-cycled WSNs in which sensors are sleep scheduled to reduce energy consumption. However, distant from the connected-k neighborhood (CKN) sleep scheduling algorithm and the geographic routing slanting sleep scheduling (GSS) algorithm, nearly all study work about geographic routing in duty-cycled WSNs has alert on the geographic forwarding mechanism; further, most of the nearby work has unnoticed the fact that sensors can be mobile. In this paper, we spotlight on sleep scheduling for geographic routing in duty-cycled WSNs with mobile sensors and recommend two geographic-distance-based related-k neighborhood (GCKN) sleep scheduling algorithms. The first one is the geographic-distance-based connected-k-neighborhood for first path (GCKNF) sleep scheduling algorithm. The second one is the geographic-distance-based connected-k-neighborhood for all paths (GCKNA) sleep scheduling algorithm. By abstract analysis and simulations, we express that when there are mobile sensors, geographic routing can realize shorter average lengths for the first transmission path explored in WSNs employing GCKNF sleep scheduling and all transmission paths searched in WSNs employing GCKNA sleep scheduling compared with those in WSNs employing CKN and GSS sleep scheduling. finally we evaluate different routing protocol with accessible scenario.

KEYWORDS: Connected-*k* neighborhood (CKN), duty-cycle, geographic routing, Wireless (mobile) sensor networks (WSNs).

I. INTRODUCTION

The main distinction of this work from existing opportunistic routing schemes is that it considers the practical issues of duty cycling and presents an opportunistic routing protocol tailored to WSNs. A packet is forwarded by the primary awoken neighbor that efficiently receives it and offers routing progress towards the goal. As a effect, by minimizing the average numbers of duty-cycles required for end-to-end packet delivery and considerably improve energy efficiency and decrease delay compared to unicast routing in WSNs. This achieves by introducing a new anycast routing metric, EDC (Estimated Duty Cycled wake-ups), that focuses on energy capability and delay instead of elevated throughput.

The sleep scheduling difficulty in duty cycled WSNs with mobile nodes (referred as mobile WSNs in the following) employing geographic routing. In this work proposes two geographic-distance-based connected-*k* neighborhood (GCKN) sleep scheduling algorithms. The first one is the *geographic-distance-based connected-neighborhood for first path*1 (GCKNF) sleep scheduling algorithm, means using first path for the transmission in the mobile sensor network. The second one is the *geographic-distance-based connected-neighborhood for all paths*2 (GCKNA) sleep scheduling algorithm, for that it calculate all the path which is possible to geographic nearest location. Supposed study and performance evaluations by simulations, when there are mobile sensors, geographic routing can accomplish much shorter average lengths for the first transmission paths searched in mobile WSNs employing GCKNF

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sleep scheduling and all transmission paths explore in mobile WSNs employing GCKNA sleep scheduling compared with those in mobile WSNs employing connected k neighbored or geographical sleep scheduling and comparisons of the routing protocol with offered system mobile objects can be provided to nearby customers. in addition, roughly all nearby works about geographic routing in duty-cycled wireless sensor networks try to change the geographic forwarding method to compact with the dynamic topology caused by various nodes being cycled off or departing to sleep mode. For instance, it is optional in to wait for the exterior of the anticipated forwarding successor first and select a backup node if the first method fails. In the sensor field is sliced into some *k*-reporting fields, then some always-on group heads are elected to collect the data from their close sensors and lastly transmit all data to the sink. Apart from the connected-*k* neighborhood (CKN) sleep scheduling algorithm proposed in and the geographic routing oriented sleep scheduling (GSS) algorithm presented in, few research works have tackled the node accessibility improbability issue in duty-cycled WSNs from the view of sleep scheduling. This paper address the sleep scheduling difficulty in duty-cycled WSNs with mobile nodes employing geographic routing. We propose two geographic-distance-based connected *k* neighbor-hood (GCKN) sleep scheduling algorithms.

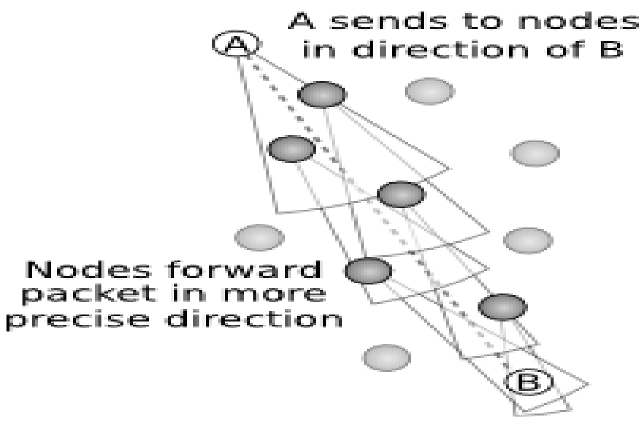

Figure 1.1 Geographic Routing Schemes

II. OBJECTIVE AND SCOPE

The goal of research is to plan an ultra-low duty cycle scheduling protocol mass for a wireless sensor network that satisfies the following requirement.

Optimizations goals:

- **Quality of Service** The design should cover that traffic arrives at the movable sensor node in a appropriate manner.
- **Energy Efficiency** The plan should strive to expand network lifetime while still adhering to Quality of Service (QOS) consideration.
- **Scalability** The propose must be scalable and task proficiently for arrangement of any size.
- **Robustness** The propose should insure that the global performance of the scheme is not perceptive to individual device failure.

The range of this research is the expansion of energy efficient and adaptive protocol stack for low data rate wireless connectivity with mobile sensor node beside different devices and very restricted energy consumption requirements, normally operating in a range of about 10 m .The aim is to be use various collective method to offer proficient sleep scheduling and mounting the network lifetime while monitoring the tradeoff between improved system lifetime, bandwidth and reliability.

III. SLEEP SCHEDULING

The essential method for sleep scheduling is to decide a sub-set of nodes to be awake in a given period while the remaining nodes are in the sleep position that minimize power consumption, so that the in general energy consumption can be compressed. Existing works on sleep scheduling in wireless sensor networks typically center of concentration on

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two targets: *point coverage* and *node coverage*. For *point coverage,* the awake nodes in each period are chosen to cover each position of the deployed field.

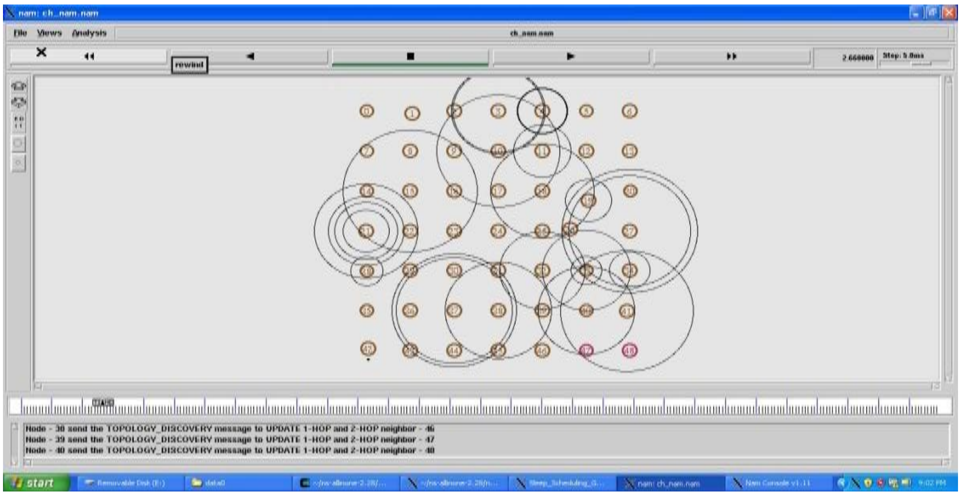
Existing *point coverage* oriented algorithms change in their sleep scheduling goals: minimizing energy consumption or minimizing normal event detection latency for *node coverage* awake nodes are designated to assemble a globally associated network such that each sleeping node is an immediate neighbor of at least one awake node. However, all these mechanism normally paying attention on the medium access layer of static wireless sensor networks with fixed nodes.

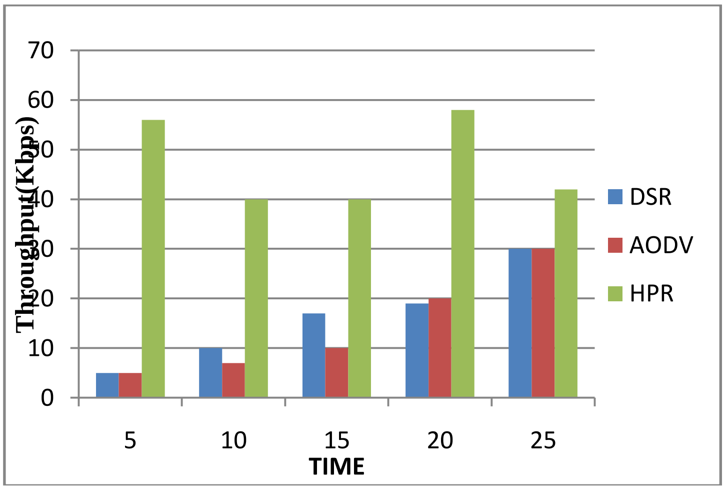
System Execution Details

- **Main scenario :**

Create main scnario by RUN

- Run option
- Enter the Source and Destination conside choose source 3 and destination 43 respectively.Then it firstly sense the data andchoose the path according to exact location.For that first it find the neighbour and non neighbourhood node whenever neighbour node find then it find the exact location of each node according to energy level it find the path which have minimum.
-





Graph 1.1 Throughput comparisons with different routing protocol.

Graph 1.1 shows time verses throughput scenario in which throughput is in kbps and time is in second. Maximum throughput is in HPR (High Performance Routing) and other routing protocol gives less performance so it is maximum

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at every level. The throughput of a communication system may be affected by various factors, including the limitations of underlying analog physical medium, available processing power of the system components, and end-user behavior. When various protocol overheads are taken into account, useful rate of the transferred data can be significantly lower than the maximum achievable throughput.

Packet dropped/loss, Pd = Ps – Pa
Where Ps is the amount of packet sent and
Pa amount of packet received.

A. Functional Diagram of System

Flow Diagram

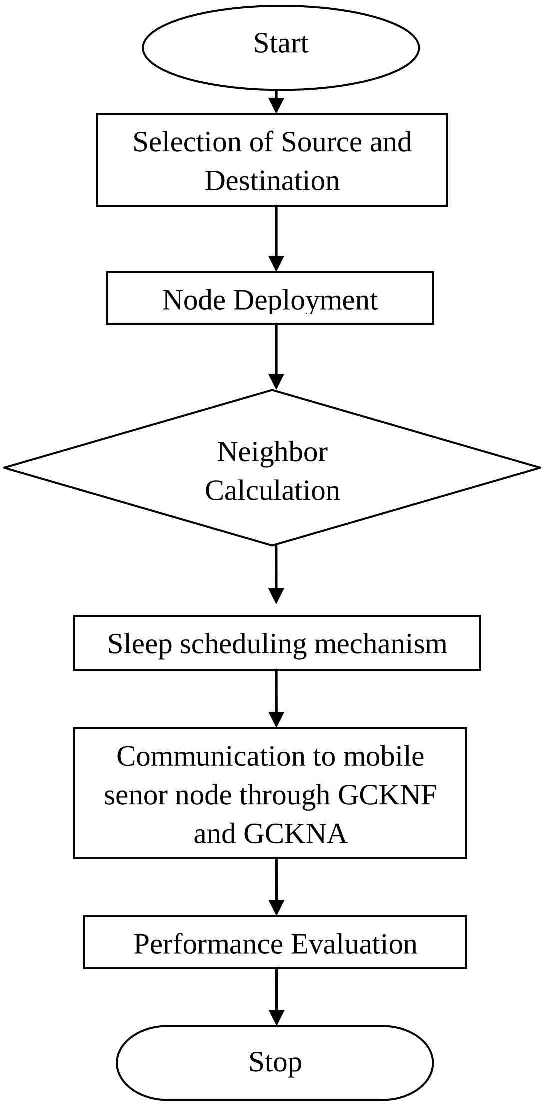

Figure 1.2 Functional Flow Chart.

IV. PACKET DELIVERY RATIO

Packet Delivery Ratio is defined as the average of the ratio of the number of data packets received by each receiver over the number of data packets sent by the source from Figure describes the comparison of HPR, AODV and DSR

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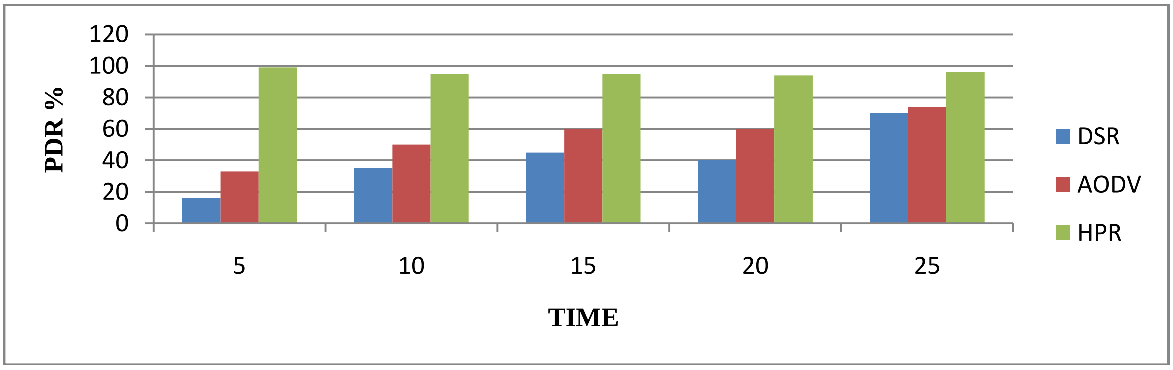
$$\text{Packet delivery ratio} = \frac{\text{No of Packet received}}{\text{No of Packet send}}$$

Table 1.1 Packet Delivery Ratio Comparison scenarios.

TIME(Sec)	DSR	AODV	HPR
05	16	33	99
10	35	50	95
15	45	60	95
20	40	60	94
25	70	74	96
30	86	90	99

From the graph 1.2 it is clears that in the geographic routing when compare different routing protocol for the packet Delivery ratio then Dynamic Source Routing Protocol is give very less performance and High performance Routing Protocol gives high performance. In 15 second the DSR gives 45% AODV gives 60% and HPR gives more than 95% Packet.



Graph 1.2 Packet Delivery Ratios (PDR)

Delivery ratio. In the Table 7.3 gives at different time interval packet delivery ratio and compare all these protocol suppose at the time 25 sec the HPR gives 96% and AODV gives 76% and DSR gives 72% so it is conclude that High Performance Routing Protocol gives high performance for packet delivery ratio.

V. PACKET DROP

Packet loss occurs one or more packets of records travelling across a network fail to reach their goal. Packet loss is typically caused by network blockage. When content arrives for a constant period at a given router or network fragment at a rate greater than it is probable to send through, then there is no other choice than to drop packets. If a particular router or link is constraining the capacity of the total travel path or of network travel in general, it is known as a restricted access. Packet loss may be calculated as frame loss rate defined as the proportion of frames that should have been forwarded by a network load were not forwarded due to lack of resources.

Packet dropped/loss, Pd = Ps – Pa

Where Ps is the amount of packet sent and

Pa amount of packet received.

Table 1.2 Packet Drop Ratio Comparison scenarios.

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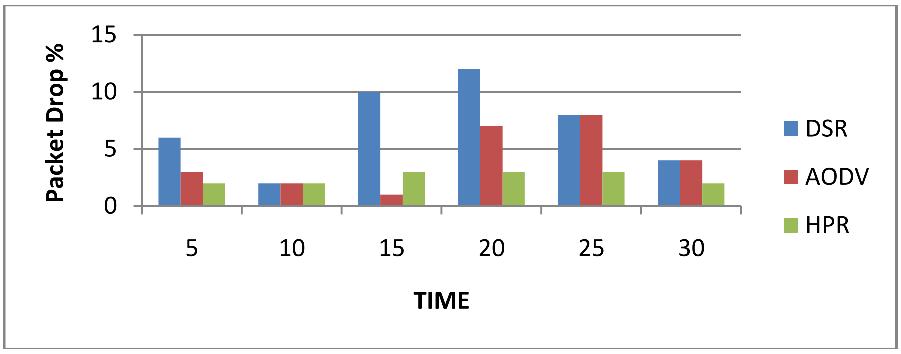
TIME(sec)	DSR	AODV	HPR
05	06	03	02
10	02	02	02
15	10	01	03
20	12	07	03
25	08	08	03
30	04	04	02

From the table 7.4 conclude that when the time is 5 second, 10 second etc. then compare packet drop ratio wirth different routing protocol like Dynamic Source Routing (DSR) protocol, Ad hoc On Demand Routing protocol(AODV) and High Performance Routing (HPR) protocol from that work it clear that High Performance Routing protocol is minimum packet drop ratio.In 5 sec time DSR is loss 6 packet,AODV loss 3 packet and HPR loss 2 packet in average respectively.So using High perforamnce routing protocol in mobile sensor network is very advantageous.



Graph 1.3 Packet Drop Ratio Comparisions.

VI. ENERGY CONSUMPTION

As shown in the table 1.3 the comparision between the HPR,AODV and DSR energy is calculated and plot in the form of the graph. The graph completely shows that the praposed HPR is definitely saves some amount of energy in the network.

Table 1.3 Average Energy Consumption Comparison scenarios.

TIME(Sec)	DSR	AODV	HPR
05	72	80	90
10	76	84	93
15	77	85	92
20	76	84	90
25	72	82	93

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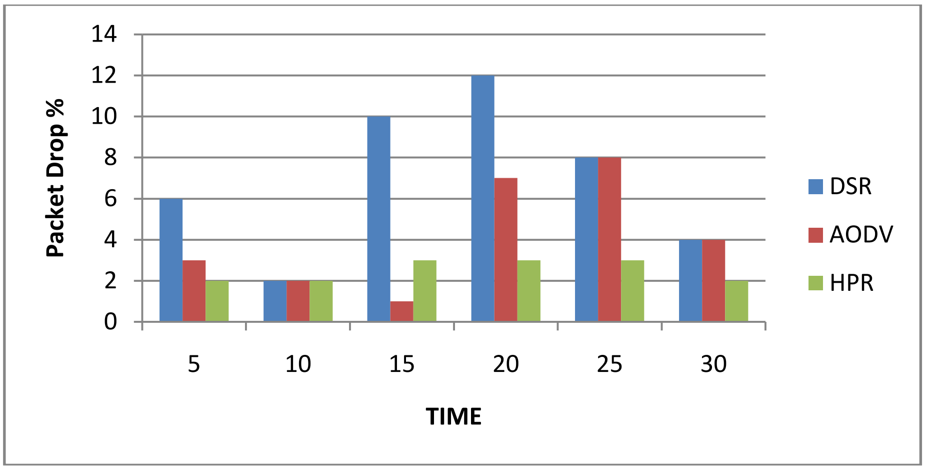
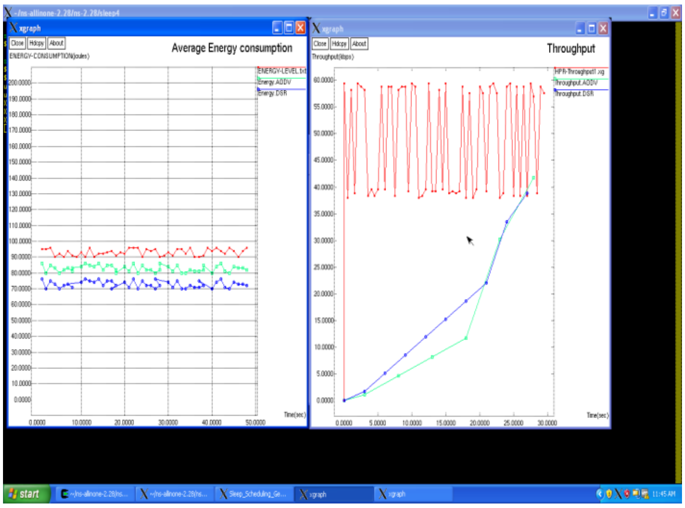


Graph 1.4 Average Energy Consumption Comparisions.

From the following table conclude that using mobile sensor network in geographic routing and using different sleep algorithm with high performance routing protocol consumed energy and packet delivery ratio, throughput these parameter give high performance and delay time can be reduced.

Table 1.4 Total performance evaluation

Packet Size	Energy Consumption	Packet Delivery Ratio	Through-put	Delay
10 kb	3.16 Joules	95%	58	3sec.
20 kb	4.75 Joules			
30 kb	5.69 Joules			
40 kb	7.28 Joules			
50 kb	7.29 Joules			



Graph 1.5 Energy and Throughput comparison graph

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Above Graph shows that the Average energy consumption with High performance routing protocol compare with the Dynamic source routing protocol and Ad hoc on demand distance vector routing protocol and also compare Throughput. Average energy consumption is more in HPR.

VII. APPLICATION SCENARIOS

Mobile wireless sensor network are much more versatile than static sensor network as they can be deployed in any scenario and change with rapid topology changes many of their application are similar, such as environment monitoring or surveillance. Mobile sensor network increases the number of applications beyond those for which static wireless static networks are used. This work advantages to better energy efficiency, improved coverage, enhance target tracking and superior channel capacity sensors can be used to people for monitoring environment Due to the advance in technology, network communication, embedded system sensor nodes can now be designed and integrated into devices much smaller and cost effective than before although the processing power efficiency has increased, Mobile sensors are able to monitor a wide variety of ambient conditions that include but are not limited to temperature, humidity ,and lightning condition. Main application of this work is find the geographical closest path and send the data because of this energy consumption and data will be fast move in any geographic area. This dissertation work is used for the building automation, logistic the controlling and monitoring measurement and communication of heating validation and air conditioning in an industrial setting.

VIII. CONCLUSION

This dissertation work is able to achieve duty-cycled mobile WSNs and proposed two geographic-distances based connected-*k* neighborhood (GCKN) first is GCKNF and second is GCKNA sleep scheduling algorithms. GCKNF and GCKNA are very effective in shortening the length of the transmission path explored by geographic routing in duty-cycled mobile WSNs. The scope of the research was to develop energy efficient. The research involved using various combined to provide efficient sleep scheduling and increasing the network lifetime while monitoring the trade-off between increased network lifetime and latency, bandwidth and reliability. The High Performance Routing protocol shows promising performance in balancing the energy and prolonging network lifetimes.

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