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Sleep and Awake Mode of Opportunistic Routing Algorithm in WSN

Archana P R[1], Tintu Mary J ohn[2]

PG Student [Communication Engineering], Dept. of ECE, CAARMEL Engineering College, Pathanamthitta, Kerala, India[1]

Assistant Professor, Dept. of ECE, CAARMEL Engineering College, Pathanamthitta, Kerala, India[2]

ABSTRACT: Recent years have witnessed the emergence of WSNs as a replacement information-gathering paradigm. Among that an oversize varies of sensors scatter over a police work field and extracts information of interests by reading real-world phenomena from the physical setting to reduce the data packets unit of measurement forwarded to the data sink via multi-hop relays among sensors. Routing could be a crucial issue in information gathering device network, whereas on the alternative hand sleep-awake synchronization is that the key issues for event detection device networks. To spice up the energy efficiency, sensors functioning supported duty cycle. The essential mechanism for sleep programming is to select out a sub-set of nodes to be awake throughout a given epoch whereas the remaining nodes unit of measurement among the sleep state that minimizes power consumption, that the general energy consumption are reduced. This focuses on sleep programming for High Speed Energy Efficient at Idle slots are want to speed up the transmission speed of the network.

KEYWORDS: Wireless sensor network (WSN),Duty cycled Geographic Routing, mobility, energy efficiency.

I.INTRODUCTION

The basic plan of geographic routing is greedy routing. Specifically, every packet is labelled with the coordinates of its destination; all nodes apprehend their own coordinates, and a node transmits the packet to its neighbour that's geographically closest to the destination. The earliest proposal for location based routing is within which incorporates a native minimum downside therein a node might haven't any nearer neighbour to the destination. For this reason, face routing and its variants are planned to use geometric rules (e.g., hand rule) to route around voids close to the native minimum shut in it happens. However, these algorithms need changing the network into a planate graph or removing this.

This is the primary path searched by geographic routing. These embody all the methods found by location based routing. Problematic cross links from the network, that aren't terribly applicable in realistic conditions what is more, there's conjointly an entire downside in geographic routing, therein a hole will be shaped by a group of dead sensing element nodes running out of energy or being broken. To unravel this downside, some analysis work tries to spot the total boundary nodes 1st then use these boundary nodes to avoid the outlet. Others attempt to use geometric modelling to seek out an optimized hole by passing routing path. Recently, by employing a step back and mark strategy once it cannot notice successive hop node, a 2 part geographic forwarding (TPGF), that doesn't have the native minimum or the total downside. With a label primarily based improvement technique, TPGF will optimize the routing methods by finding one with the smallest amount range of hops. However, of these works solely take into account WSNs with static nodes.

Recently several timeserving routing protocols are planned to increase geographic routing to duty cycled WSNs. all of them attempt to reach this goal by dynamically selecting the forwarding node supported the simplest potential node that may transmit packets. Specially, these protocols usually take under consideration such factors as link uncertainty to adapt routing consequently. However, few of those works address the native minimum or whole drawback, and nearly of these works don\'t take into account matters that device nodes will be mobile.

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II.RELATED WORKS

The existing works on sleep planning in WSNs is mainly targeting a pair of targets: purpose coverage and node coverage. The Awake nodes in each epoch square measure chosen to cover every purpose of the deployed field in purpose coverage (also stated as abstraction coverage). Existing purpose coverage oriented algorithms dissent in their sleep designing goals: minimizing energy consumption or minimizing average event detection latency. For the purpose of node coverage (also referred to as network coverage), awake nodes square measure elite to construct a globally connected network such each asleep node may be a quickly neighbour of a minimum of 1 awake node.

However of those works generally targeted on the medium ACC layer of static WSNs with static nodes. totally different disadvantages embrace native minimum disadvantage arise as a results of nodes gift shut sink, Sink mobile information is flooded alone on demand, each node should not have enough initial neighbours thus on kind it easier for the node neighbour node demand.

III.MODULES INVOLVED

A. Sleep/Awake control

In general, sensing element nodes area unit little, low value equipment and usually subject to a tight energy constraint. Hence, energy conservation could be a crucial issue for WSNs. a way to reserve the ability of sensing element nodes to extend the effectiveness of entire network is that the worthy issue for several researchers. The technology of power saving is separated into four study aspects .

1. The schedule between the sleeping and waking up of sensors: achieves the effectiveness of saving power by sleeping mechanism.
2. Power management is employed in sensing elements to regulate the vary of sense: typically sensor nodes area unit created at the foremost sensitive vary once sensing, however exploitation power management to regulate the sense vary are going to be able to attain the effectiveness of saving power.
3. Effective routing path to Sink: as wireless sensing element nodes adopt the strategy of Multi Hops, therefore a way to notice a shortest path and create the info transmitted to the sink to succeed in throughout of power saving is incredibly necessary.
4. Cut back the overhead of knowledge: once a sensing element node delivers data, alternative nodes near it's going to receive the data that's not transmitted to them. This can cause the consumption of power, therefore commonly the close to nodes are going to be created to sleep to avoid the happening of overhead.

There is a unit four quite the energy consumption in WSNs besides transmittal and sensing.

(1) Collision: The collision can occur if there is a unit 2 nodes wish to transfer information to a similar node. By this case, the each nodes need to carry the information and therefore the energy are going to be wasted.

(2) Sparse: In traditional, the nodes area unit deployed by random. There'll be distributed in some areas thanks to the random readying. The nodes in these areas can consume a lot of energy for transmittal.

(3) Overhead: once nodes transmit information to the opposite node, the neighbour nodes can receive this redundant information. It'll waste the energy for receiving the redundant information.

(4) Idle: There is a unit 3 standing for every node that area unit sleep, active and idle. If keep in idle standing with long length, it waste the energy for listening channel.

B. GCKN Sleep Scheduling A lgorithm

There are 2 geographic-distance-based connected-k neighbourhood (GCKN) sleep programming algorithms. 1st|the primary} one is that the geographic distance primarily based connected-k neighbourhood for first path (GCKNF) sleep programming algorithmic program. The other is that the geographic-distance-based connected-k neighbourhood for all paths (GCKNA) sleeps programming algorithmic program.

C. *CSMA/CA*

Here the controller of waterproof is enforced on high of the link layer. Every node will grasp the neighbour data at the time of your time slot allocation. Whereas slot allocation every node shares it's immediate node data to others, thus by this data every node will store the knowledge concerning two hop neighbours cluster information, like virtual bunch.

In wireless detector network, the nodes are stable and static for his or her life time, therefore the neighbour node convenience not about to be amendment until last. and therefore the main work is to keep up sleep a lot of and effective knowledge forwarding by accessing the waterproof layer, therefore the link failure is out of the scope of this and there

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are such a large amount of routing strategies offered to focus on link failure, thus it\'s necessary to incorporate and check the link failures with Improved Sleep planning protocol.
Within the improved Sleep planning enforced the entire node will sleep and awake at same time and same interval, if it not has any knowledge. In case, any node has the information to send to base station then sender and receiver ought to be in active mode, remaining the entire node will visit sleep. to form synchronization b/w sender and receiver and neighbour node use RTS/CTS.

As shown in figure 1, here the entire time is split into slots, and any slots into sub slots. Every node synchronic timer, therefore every node is aware of once the time interval begins and ends. All the nodes are going to be in idle listen mode at starting of every time interval. If any node has information then the node can check the slot convenience in sub slot. If node has high priority information then it will occupy initial sub slot, or own slot suggests that second sub slot alternatively third sub slot.

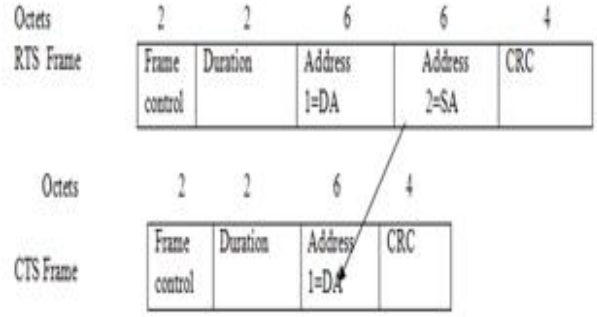

Fig. 1 CTS/RTS frame

D. *HSEEIS Algorithm*
High Speed Energy Efficient at Idle Slots combines the strength of CSMA, pair wise TDMA (link scheduling) and broadcast TDMA. The owner calculation is performed by each sensor node locally by clock arithmetic. Consider the figure 2 let there are 8 neighbour nodes. In that every node is 1 or 2 hop neighbour to each other. Consider the diagram given below. In that T1, T2….represent the slot sequences and S1, S2…represent the sensor nods.
The rendezvous slots can also be calculated by clock arithmetic. Let node S1 wants to create a rendezvous.

S1	S2	S3	S4	S5	S6	S7	S8	S1	S17
T9	T10	T11	T12	T13	T14	T15	T16	T17	T18

Fig. 2 Rendezvous slot selection for 8 sensor nodes (T17 is rendezvous slot for s1 but T9 is not rendezvous slot)

Figure 2.using modulo 16, the rendezvous slots of node S1 will be a subset of[1,17…]. S1 can make T17 as its rendezvous slot. It is because 9 is not a subset of [1, 17…].
Consider a simple case of four sensor nodes A, B, C& D. And there are four consecutive slots. During Slot i, Let data **transmission** occur between node **B and C**. But **A and D** also need to **wake up** subsequently they go to **sleep.**

IV.RESULTS AND DISCUSSIONS

Networksimulator is used here. By using ns2, the results can be achieved by NAM and another one is X graph.

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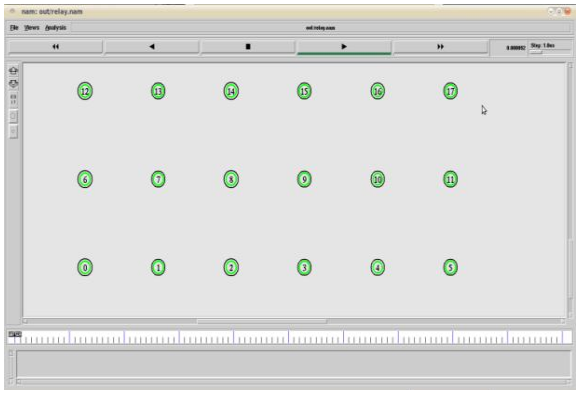

Fig. 3 Network topology

Figure 3 shows the network topology. In this the network is considered with grid type of topology with 17 sensor types of nodes and one base station.
CSMA/CA technique is used here. So each node has the slot to transfer the data. In this it has considered the individual and random time slot allocation based on virtual clustering method.
Figure 3 shows the result of time slot allocation. Figure 3 shows the confirmation message sharing for allotted slot information. Figure 4 shows the requesting message to own slot allocation.

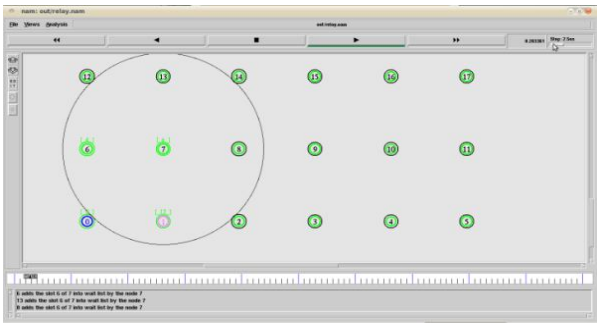

Fig. 4 Node 0 shares the slot req message sharing

Figure5 shows the result of allocated time slot for each node.Ifone slot is allocated by other node means previous/next two nodes can't be access the same time slot at a time. So each node aware about next hop node one two hop node information also (virtual clustering).

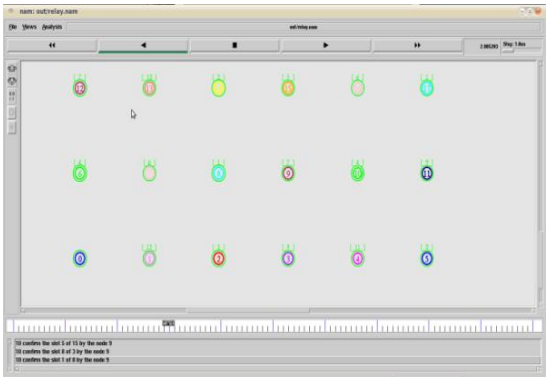

Fig. 5 Allocated time slot for each node

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The main aim is energy saving and also throughput level by controlling the MAC layer and Physical layer. So the considered network layer with simply hop greedy routing model. The base station will share the originating message at beginning but after time slot allocation. Each node will receive the originating message, and will forward to others after updating the routing information. The route to destination will be selected based on less hop count.Figure 6 shows the originating message sharing from base station.

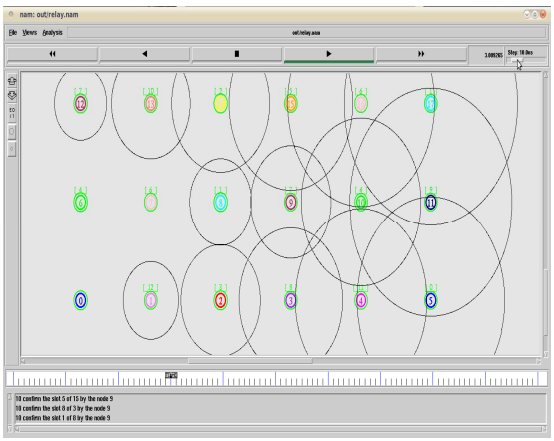

Fig. 6 Base station shares the originating message after time slot allocation

After synchronization the sensor node can send the data to base station through the intermediate sensor nodes. In TDMA method the node can send the data only in own slot. Figure.10 shows the model of TDMA.

In the system, implemented Sleep Scheduling with reduced overhead model as like as in TDMA method, also divided time into time slots, but unlike TDMA method each node can use the other time slot when the time slot is free. To check whether time slot is free or not, it has connected CSMA/CA method.

The performance of different technique can be viewed by using Xgraph. This is done in a progressive manner. First implement the model of Basic S-mac method. In basic SMAC each node has the independent timer to make on and off the node. In basic s-mac each node will announce it status by the synch message

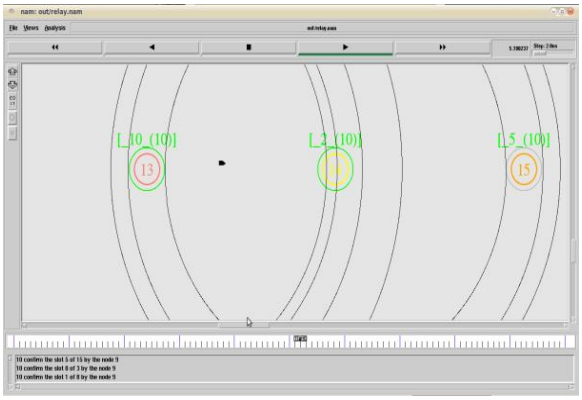

Fig. 7 Model ofTDMA (own slot data transmission)

Here the basic SMAC mode in AODV protocol (AODV protocol is simple and easy to access and modify that's why it has selected AODV protocol to manage sleep) is implemented. Then Time slot allocation like basic TDMA method with sleep mode control is implemented, and then the priority model with TDMA model is added.To make Sleep

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Scheduling other slot access is implemented by dividingtime slot into three small slots, and then it has applied the power control technique.

V. CONCLUSION

High Speed Energy efficient at Idle Slot for Wireless sensor Network is enforced. Here within the projected system parameters like outturn, packet delivery fraction, delay, energy and overhead are improved compared to the prevailing system. These are achieved with the assistance of unintentional on demand vector routing, geographic routing and CSMA/CA.

Table 1: Result comparison

PROTOCOLS	THROUGHPUT	PDF	DELAY	ENERGY	OH
Basic SMAC	1.74 %	19	1.25 ns	99.949 J	218
TDMA without priority	1.27 %	16	2.3 ns	99.971J	
TDMA with priority	5.75 %	70	0.55 ns	99.972 J	
IHMAC	6.2 %	75	0.39 ns	99.973J	59
Proposed	7.5%	80	0.22	96.943	20

Table 1 shows the different protocols quality factors variations and their performances.The vital mechanism concerned within the projected system is sleep/active mode of the device nodes. This is often obtained with facilitate of geographic distance primarily based connected-k sleep programming algorithms. This formula contains of two algorithms. Initial primary one is geographic distance primarily based connected- k for first path sleep programming formula and other is that the geographic distance based connected-k for all path sleep programming formula.

VI. FUTURE WORK

In improved HSEEIS are going to be enforced with all the node will sleep and awake at same time and same interval, if it not has any knowledge within the future. In case, any node has the information to send to base station then sender and receiver ought to be in active mode, remaining the entire node will visit sleep to form synchronization between sender and receiver and neighbour node, RTS/CTS can be used. This divided total time into slots, and additional slots into sub slots. Every node synchronic timer, so each node knows when the slot begins and ends. All the nodes will be in idle listen mode at starting off every time slot. If any node has data then the node can check the slot accessibility in sub slot. If node has high priority data then it can occupy first sub slot, or own slot means that second sub slot alternatively third sub slot. For that the fundamental CSMA/CA protocol with some modifications are going to be used.

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