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M-SPIN- LA Algorithm for energy efficient Wireless Sensor Networks on 2D Surface

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Abstract :Wireless Sensor Networks (WSNs) consist of thousands of tiny nodes having the capability of sensing, computation, and wireless communications. Many routing, power management, and data dissemination protocols have been specifically designed for WSNs where energy consumption is an essential design issues. Since wireless sensor network protocols are application specific, so the focus has been given to the routing protocols that might differ depending on the application and network architecture. The study of various routing protocols for sensor networks presents a classification for the various approaches pursued. The two main categories explored are negation based and location-based. Each of the routing schemes and algorithms has the common objective of trying to get better A comparison has been made between two routing protocols, M-SPEN & M-SPEN-LA, on the basis of throughput and power consumption of the network. Our simulation results show that the proposed algorithms can tolerate distance measurement errors, and thus work well under practical sensor network settings and effectively promote the performance a range of applications that depend on triangulations and energy efficiency approach .

Introduction

In this situation, the emergence of wireless sensor networks (WSNs) is essentially toward the miniaturization and ubiquity of computing instruments. Sensor networks are composed of countless numbers of valuable useful resource restricted sensor nodes and also some resourced base stations are there. All nodes in a community keep in touch with each and every one of a kind via wireless conversation. In addition, the vigor required to transmit a message is about twice as great as the vigor desired to obtain the equal message. The route of every message destined to the base station is quite central in phrases group lifetime: e.G., utilising rapid routes to the base station that comprises nodes with depleted batteries could yield decreased network lifetime. On the opposite hand, utilising a chronic route composed of many sensor nodes can greatly broaden the network extend.However, some standards for the routing protocols are conflicting. Consistently choosing the shortest route toward the backside station explanations the intermediate nodes to dissipate faster, this outcome in a diminished network lifetime. At the same time, regularly determining the shortest direction would results in lowest power consumption and lowest network extend. Sooner or later, the routing objectives are tailored by the use of the utility; e.G., real-time purposes require minimal community extend, while features performing statistical computations may just require maximized community lifetime. As a consequence, specified routing mechanisms had been proposed for distinctive purposes. These routing mechanisms notably variety in phrases of routing ambitions and routing systems, the place the approaches are more often than not influenced via the neighborhood characteristics.

RESULTS, PERFORMANCE EVALUATION & ANALYSIS

This chapter shows the results of the simulation. The analysis is being done on the basis of the results of *.ned file and the *.anf file. We also evaluate the performance of the protocol. In the OMINETpp ++ stand allinone package NED is a build-in program. NED helps us to see the flow of message between the micro sensor node. It also shows the packets are dropping or reaching to the destination properly. When the source.c file is written, NAM is invoked inside that file. With the help of 2D graphs we have tried to analyze the simulation with different simulation time. The scripts for the NAM is stored as *.nam and for tracegraph *.elog is used. The simulation has been mainly divided in three parts that are given below:

- Simulation of M-SPEN protocol
- Simulation of Location aware protocol
- Simulation ofM- SPEN- location aware

The comparison between M-SPEN and M-SPEN- location aware is performed over the common factors like throughput of dropped packets, end-to-end delay and energy consumption in the network over different simulation rounds. Also for short-range communication, SPEN with Location aware has been implemented over different topologies.

6.1. Simulation of M-SPEN

Simulation of M-SPEN protocol is performed over 40 micro sensor node having same energy. Micro sensor node in the network are in random position. In this scenario there is a source node that will broadcast the data and all the neighbouring micro sensor node will do the same after receiving it. node 1 is the sink node. In figure 6.1 source micro sensor node is negotiate the data to its neighbouring micro sensor node. The negotiate of packets is shown by direction Because all the micro sensor node are negotiate the data, so there will be energy loss in the network continuously. When a particular node receives a fix amount of data it changes its color to show the energy loss. In figure 6.1 some micro sensor node became yellow due to receiving more broadcast and so more energy loss

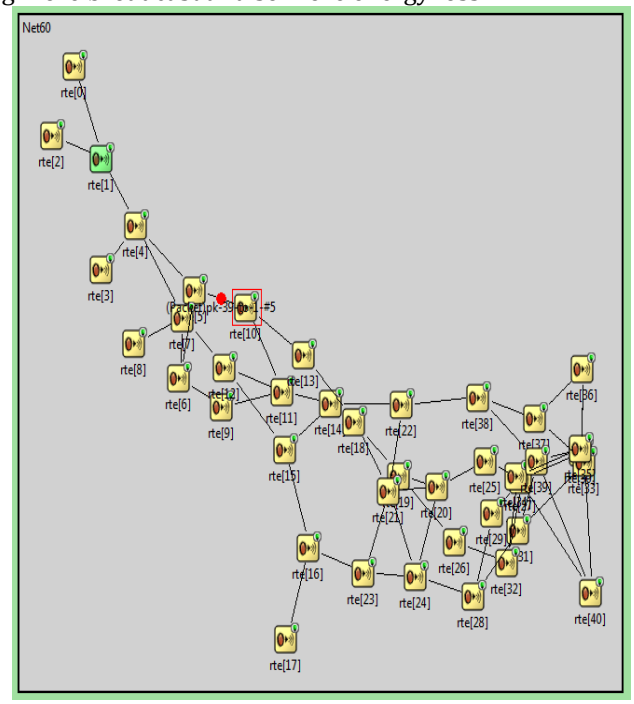


Fig.6.1 M-SPEN micro sensor node

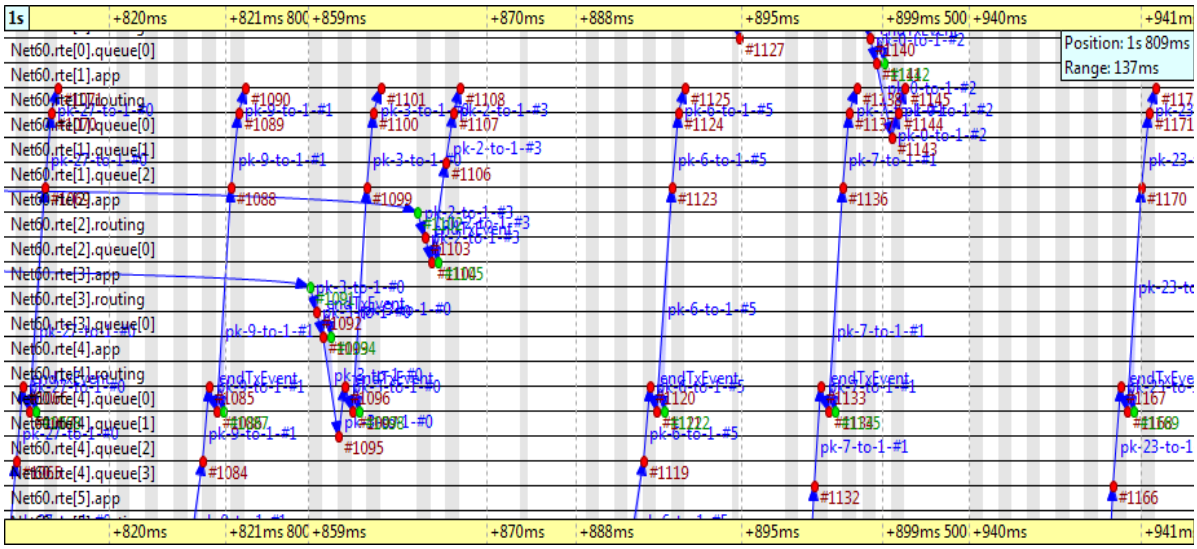


Fig.6.2

The tracegraph snapshots have been taken in fig 6.2 with the simulation time of 941ms . In figure 6.4, the entire simulation scenario has been displayed along with the end-to-end delay. The throughput of sending and receiving protocols has been displayed in figure

Table 6.1

Parameters configuration	M-SPEN	M-SPEN-LA
Network. PlaygroundSize X,Y,Z	1000m	1000m
Network.NumMicro sensor node	40	40
Network. ConnectionManager.pMax	50mW	50mW
Network. ConnectionManager.sat	-84dBm	-84dBm
Network. ConnectionMana CarrierFrequency	2.412e+9Hz	2.412e+9Hz
Network.node[*].networkType	"BaseNetwLaye	"BaseNetwLaye
Network.node[*].applicationType	"SensorApplLay	"SensorApplLay
Network.node[*].nic.txCurrent	17mA	17mA
Network.node[*].nic.mac.headerLer	24bit	24bit
Network.node[*].nic.mac.bitrate	100000bps	100000bps
Network.node[*].nic.phy.thermalNo	-100dBm	-100dBm
Network.node[*].battery.capacity	999mAh	999mAh
Network.node[*].battery.voltage	3.3V	3.3V

Simulation of M-SPEN with location awareness Protocol

The same topology has been implemented for M-SPEN with location awareness protocol with same source node and same sink node. The difference between the simulation of M-SPEN and M-SPEN with location awareness protocol is that in M-SPEN-LA, the communication starts from node itself. When the node sends the interest about what its location, source node sends a coordinate in reply and then data is being delivered to the sink according with minimal transition power.

In this simulation scenario, of all source micro sensor node node and other node 7 is the sink node. source node sends the location information to neighbor Source node . In figure 6.9, source node is sending location information to all the neighboring micro sensor node. All the micro sensor node in the network have a cache to store the different location. In figure 6.10, source node 7 is sending information back to the sink node through the same way.

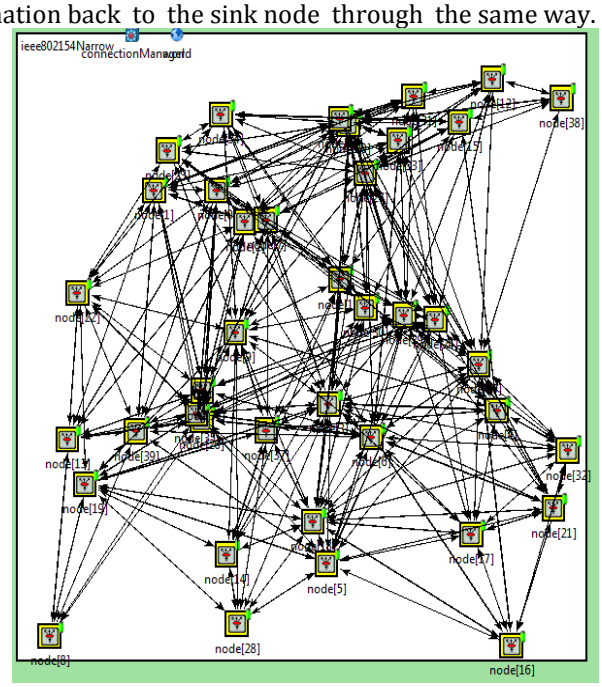


Fig 6.3

The animation capture in figure 6.3, shows that the source is broadcasting its location information to all its neighboring nodes. The source (node 20) is broadcasting message to all its neighbors and Node 4, which is the destination node, is sending (route reply) back to the source. in red color has been shown in figure 6.4. In figure 6.21, a packet in yellow color is transmitting from the source (node 20) to the destination (node 4).

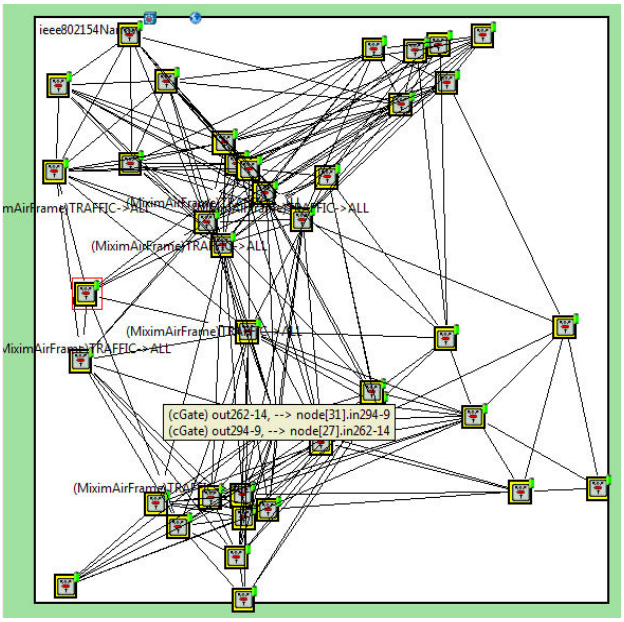


Fig 6.4

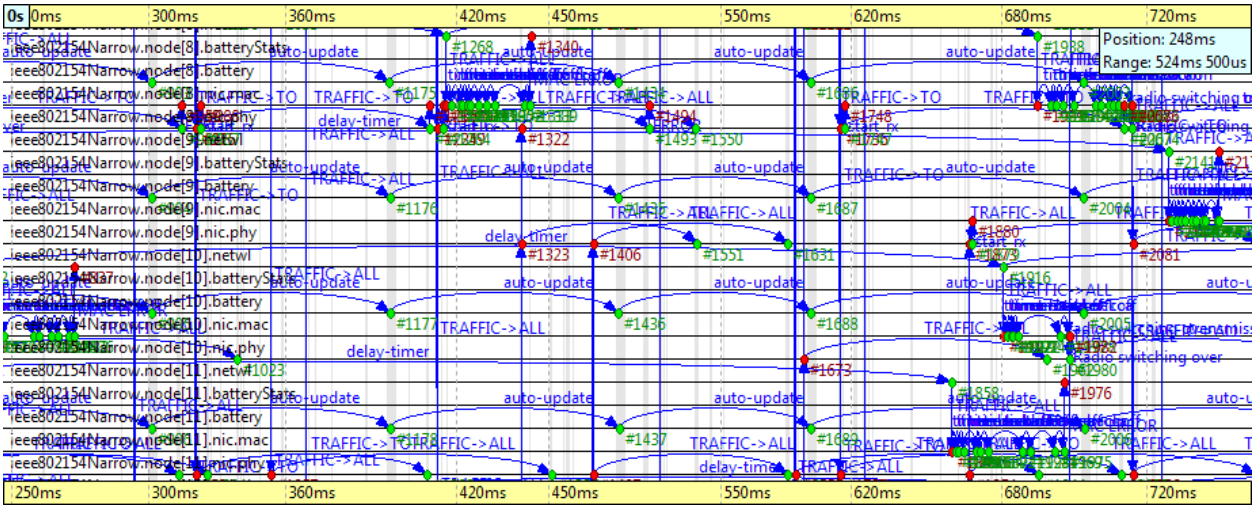
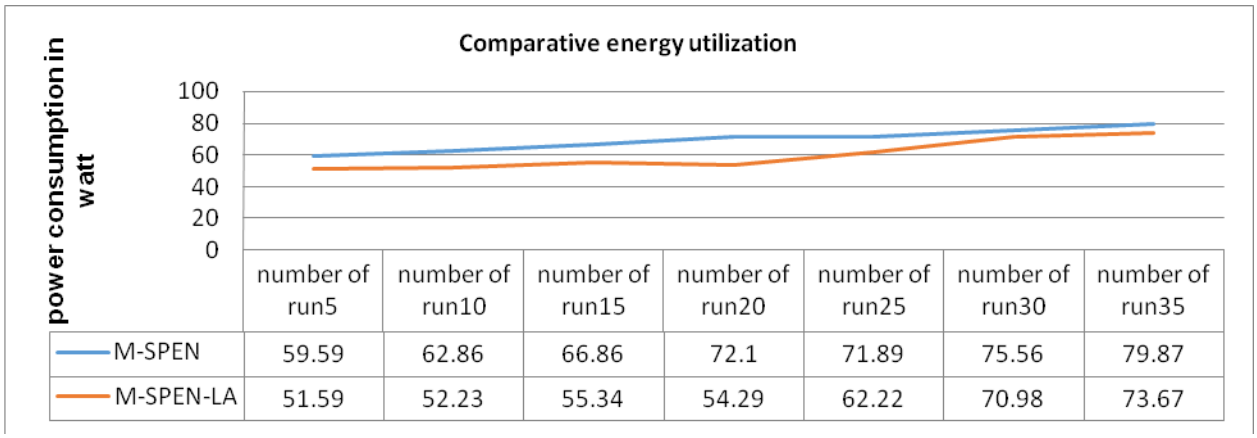


Fig 6.5

The tracegraph snapshots have been taken with the simulation time of 941ms . In figure 6.5, the entire simulation scenario has been displayed along with the end-to-end delay. The throughput of sending and receiving protocols has been displayed in figure



	number of run5	number of run10	number of run15	number of run20	number of run25	number of run30	number of run35
M-SPEN	59.59	62.86	66.86	72.1	71.89	75.56	79.87
M-SPEN-LA	51.59	52.23	55.34	54.29	62.22	70.98	73.67

Fig 6.5 Comparative energy utilization with different number of runs

On a average wee can estimate that M-SPEN-LA is 20% more efficient than M-SPEN

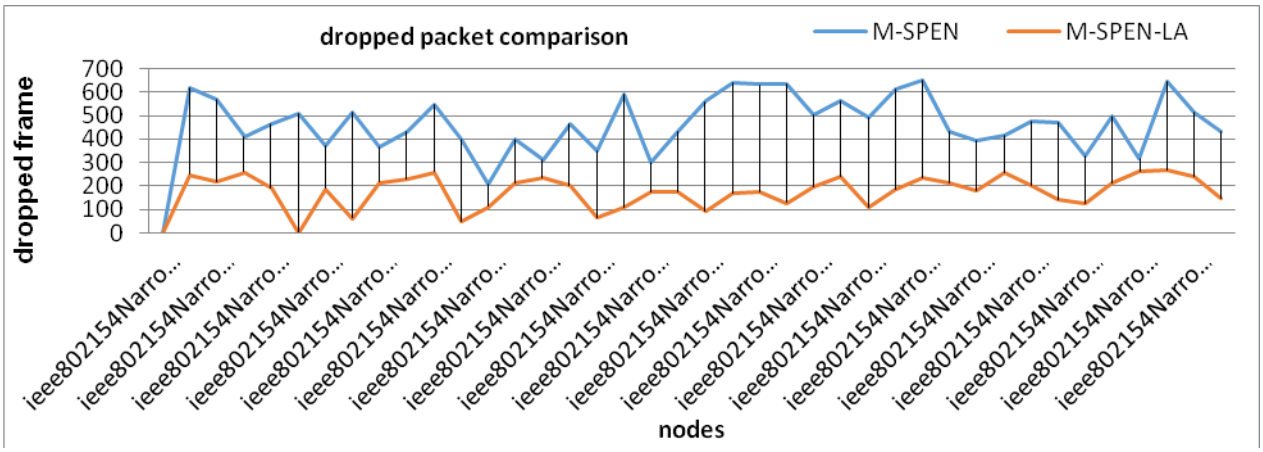
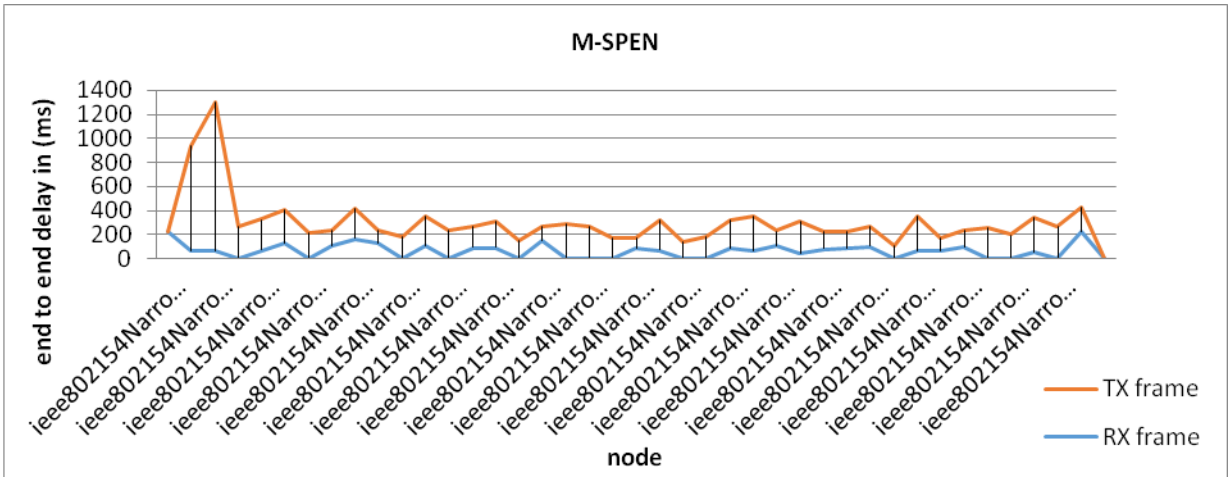


Fig 6.7 **comparative analysis of dropped packet**



Routing is a significant issue in Wireless Sensor Networks. The objectives listed in the problem statement have been carried out properly. In the presented work, we have discussed a comparison of two routing protocols for wireless sensor network with different simulation rounds. Also location awareness topology over WSN is simulated with different topology changes. We sincerely hope that our work will contribute in providing further research directions in the area of routing. With the results of tracegraph, we can conclude that in the case of M-SPEN-LA, throughput of energy packets is quite less than the throughput in the case of M-SPEN. Also end-to-end delay is also better in the case of M-SPEN. Since energy of the nodes is a constraint in wireless sensor network, so a fix amount of energy is given to the network in both the cases. In the case of M-SPEN, network effenciency is 85 % and for M-SPEN -LAit is almost 91 %.Since M-SPEN is negation based so there is no need for a node addressing mechanism. M-SPEN LA can reduce the bandwidth needed for sensor networks. Each node is assumed to do negation, caching and sensing. M-SPEN LA is energy efficient since it is on demand and no need to maintain global network topology.A comparison study is being performed over Location awareness with battery energy 999 mA and simulation time of 100 seconds. For short-range wireless communication in WSN, Negation with location awareness is used and the results are compared on the issues like throughput of sent packets, dropped packets, end-to-end delay and network energy . M-SPEN with Location awareness has provided better results in comparison to M-SPEN

In the presented work, a comparison has been carried out in a simulated environment;it would be interesting to note the behaviour of negation and traingulization on a real-life test-bed. Further, we can also investigate the behaviour of other WSN routing protocols such as – TEN, LEACH and PEGASIS.

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