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Energy Efficient Routing In Wireless Sensor Networks Using Various Routing Protocols

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Abstract: Wsn routing nodes can be implemented on any type of industries,battlefield and are able to organize themselves in a broad-scalable wireless ad-hoc network. Genral or common routing protocols do not exist into account that a hope contains only a Suppresed supply of energy. Optimal routing always tries to enhance the duration of time over which the sensing work can be performed, But requires further knowledge. As this is very much unrealistic, we derive a practical scenario based on the energy obtained from various histograms and modify a spectrum of latest techniques to improve the route generation in sensor networks. Our very first approach aggregates packet transmission in a robust way, resulting in reduction of energy upto factor 2 to 4. Secondly, we argue that a more static resource utilization can be gained by shaping the traffic movement and flow. Various techniques, which depend only on localized parametres are proposed and calculated. We show that they can enhance the lifetime of network up to an extra 92% irrespective of the gains of our previous approach.

Keywords: VANETS, MANETs, Ad- hoc Network, NS-2.34, Trace graph

INTRODUCTION: Recently Integreted circuits and MEMS have reached to the point where they enhance the integration of all type of communications, sensors and processing of signals all together in one cheap cost package. It isnow easy to design and fabricate micro-small sensor nodes that canbe distributed on the ground field to get all the strategicinformation [1]. The scenario detected by these nodes needto be communicated for provideing gateways or hosts who enter into thenetwork. This process of communication occurs via various-node routesthrough other sensor nodes. Since the nodes need to beunobtrusive, they have a small form-factor and thereforecan carry only a small battery. As a result, they have alimited energy supply and low-power operation is a must.Multi-hop routing protocols for these networks necessarilyhave to be designed with a focus on energy efficiency.

Wireless Sensor Networks (WSNs) subsist of mostly four components: radio, processor, sensors and battery. A WSN is formed by densely deployed micro sensor nodes that have proficiency of sensing, establishing communication between each other, computational and processing operations. Sensor nodes are micro-electro-mechanical systems (MEMS) that produce a measurable response to a change in some physical condition like temperature and pressure. Sensor nodes sense or measured physical data of area to be monitored. The consecutive analog signal sensed by the sensors is digitized by an analog-to-digital converter and transmitted to controllers for more treating. Sensor nodes are of very small in size, consume extremely low energy and are operated in high volumetric densities. It can be autonomous and robust to the environment. The contiguous of sensor nodes in the field may be large. As wireless sensor nodes are generally very small electronic devices, they can only be supplied with a limited power source. Each sensor node has a convinced area of coverage for which it can reliably and accurately report the particular quantity that it is penetrating. Several sources of power consumption in sensors are signal sampling and conversion of physical signals to electrical, signal conditioning and analog-to-digital conversion.

LITERATURE REVIEW:

Gerard chalhoub and Michel misson,[3] proposed a time segmentation approach that saves energy, enables quality of service in terms of guaranteed access to the medium and improves the overall performance of the Network. This time segmentation is achieved by synchronizing nodes activity using tree-based topology.A synchronization period that guarantee collision free beacon propagation along the cluster-tree. Then they propose a data collection period in order to improve the energy efficiency of the network and the network performance. Finally, by adding relay time intervals between coordinators, able to improve further more the network performance and guarantee an end-to-end delay. Their results show that the overall Estimated energy consumption have reduced with respect to a cluster-tree configuration, the percentage of received frames is increased by 20 % to 40 %, and the average number of collisions is divided by 2 in most cases.

Liu Yueyang, Ji Hong, YueGuangxin,[4] Proposed a new chaining algorithm EB-PEGASIS, which uses distance threshold to avoid this phenomenon in PEGASIS. Using this algorithm, the sensor networks can achieve energy balance and prolong network lifetime. This enhanced algorithm EB-PEGASIS, which can avoid "long chain" in chaining process through average distance of network. EB-PEGASIS can guarantee approximately the same in consumed energy of sensor nodes and avoid the dying of some nodes early than other nodes to protract the period of sensor networks.

Kunjan Patel, et al., presented a reliable and lightweight routing protocol for wireless sensor networks in their paper. They claimed more than 90% savings in number of transmissions compared to the message flooding scheme when the same route was used to transmit data messages. This saving increased exponentially as the number of transmissions increased over a same route. The protocol occupied only 16% of total available RAM and 12% of total program memory in MICA platform which make it very lightweight to implement in wireless sensor networks.

Mohamed Hafeeda and HosseinAhmadi,proposed a new probabilistic coverage protocol (denoted by PCP) that considered probabilistic sensing models. PCP was fairly general and used with different sensing models. In particular, PCP required the computation of an indivisible parameter from the supported sensing model, while all other things persists same. They showed how this parameter could be derived in general, and the calculations for two example sensing models: (i) the probabilistic exponential sensing model, and (ii) the commonly-used deterministic disk sensing model. They compared their protocol with two existing protocols and claimed for the better performance as they proposed.

Samia A. Ali and Shreen k. Refaayproposed an efficient routing protocol called CCBRP (Chain-Chain based routing protocol). It achieves both minimum energy consumption and minimum delay. The CCBRP protocol mainly divides a WSN into a number of chains using Greedy algorithm and runs in two phases. In the first phase, sensor nodes in each chain transmit data to their chain leader nodes in parallel. In the second phase, all chain leader nodes form a chain and randomly choose a leader node then all nodes send their data to this chosen leader node. This chosen leader node fuses the data and forwards it to Base Station (BS). Experimental results demonstrate that the energy consumption of the proposed CCBRP is almost as same as for PEGASIS and 60% less than LEACH and 10% less than CCM for WSN with hundred nodes distributed in 100m x 100m area. The delay of the proposed CCBRP is the same as of LEACH and CCM but 75% less than of PEGASIS.

NishaSarwadeet. al. [2] presented in this paper some of the major power-efficient hierarchical routing protocols for wireless sensor network used. In a hierarchical architecture, higher energy nodes can be used to process and send the information while low energy nodes can be used to execute the sensing in the adjacency of the destination. This means that creation of clusters and assigning special tasks to cluster heads can greatly contribute to overall system scalability, period, and energy decisive. Hierarchical routing is an efficient way to lower energy consumption within a cluster and by performing data aggregation and fusion in order to decrease the number of transmitted messages to the BS. Hierarchical routing is mainly two-layer routing where one layer is used to select cluster heads and the other layer is utilize for routing.

TarunGulatiet. al. [3] proposed this paper on node reliability in Wireless sensor network. Each sensor is defined with limited energy. Wireless sensor node deployed into the network to monitor the physical or environmental condition such as temperature, sound, vibration at different location. The protocol play important roll, which can minimize the delay while offering high energy efficiency and long span of network lifetime. One of such protocol is PEGASIS, it is based on the chain structure, every chain have only one cluster head, it is in charge with every note's receiving and sending messages who belong to this chain, the cluster head consumes large energy and the times of every round increasing. In PEGASIS, it take the advantage of sending data to it the closet neighbor, it save the battery for WSN and increase the lifetime of the network. The proposed work in this paper is about to select the next neighboring node reliably.

OBJECTIVE:

An objective of this thesis work is as follow:

- The study focus on analysis of WSN Routing Protocol.
- Prepare the Wireless Sensor Network (WSN) scenario with simulation time of 100sec with 10 nodes, 15 nodes and 20 nodes.
- Analyzing the effects of residual energy, throughput, normalized routing load and network lifetime in WSN scenario with different environment.
- Analyzing the results of AODV, AOMDV, DSDV and PEGASIS protocols to analyze which one type of protocol gives better performance.

SIMULATION AND RESULT

Simulation Parameters: In our scenario we take 10 ,15and 20 nodes and The simulation is done using an open source simulator NS-2, to analyze the performance of the network by varying the nodes mobility. The protocols parameters used to assess the performance are given below:

PDR: In order to calculate the Packet Delivery Ratio (PDR) in velocity and density scenarios, the number of packets received by the destination will be divided by the number of packets originated. The attained value specifies the packet loss rate which confines the maximum throughput of the network. The better PDR implies the more accurate and suitable routing protocol.

Throughput: Throughput is the average rate of successful message delivery over a communication channel. The system throughput or aggregate throughput is the sum of the data rates that are delivered to all terminals in a network. Throughput is essentially synonymous to digital bandwidth consumption; it can be analyzed mathematically by means of queuing theory,

Average End-to-End Delay: The time taken by the data packets to be delivered from source to destination is known as Average End-to-End Delay. Therefore, the time at which the first data packet is received by destination deducted from the time at which the first packet transmitted by the source. The Average End-to-End delay value implies the time consumed for all possible delays caused by buffering procedure whilst performing route discovery procedure, interface queuing, the retransmission procedure performed at MAC and propagation times. Figure 6 illustrates the Average End-to-End delay diagram associated with mentioned routing protocols.

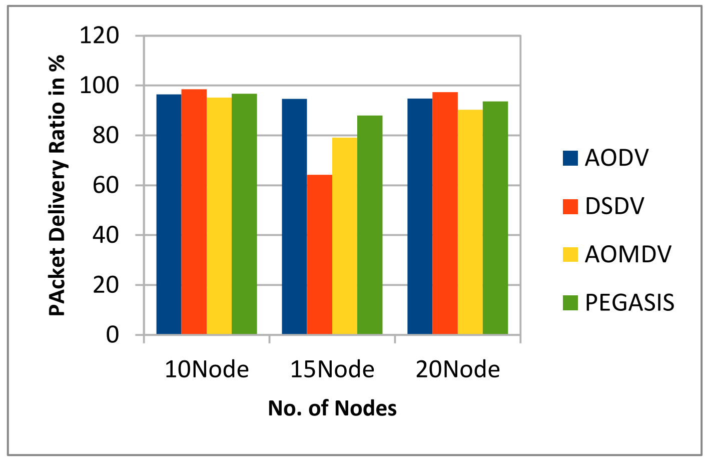
Normalized Routing Load: Normalized routing load (NRL) is defined as the number of routing packets transmitted per data packet arrived at the destination.

Simulation Parameter:

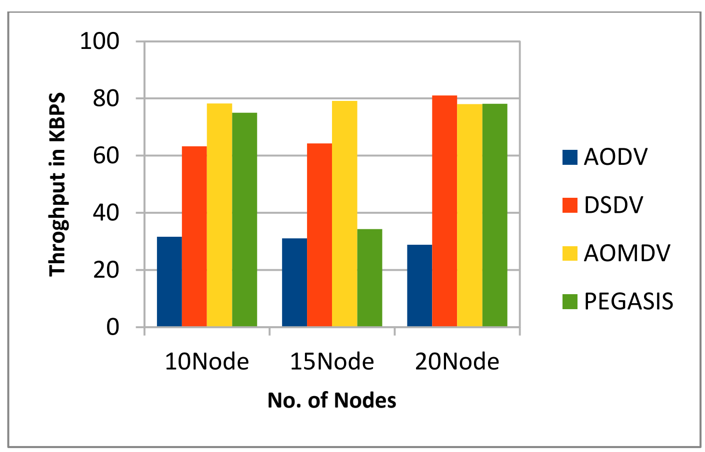
Table 1: Simulation Parameters Considered

Parameters	Values
Simulator	NS-2.35
Mobility Model	Random Way Point
Antenna type	Omini
Area of Map	1500*1500
PHY/MAC	IEEE 802.15.4
Routing Protocol	AODV,DSDV,AOMDV, PEGASIS
Network Traffic	TCP
Simulation Time	100sec
Antenna type	Omini

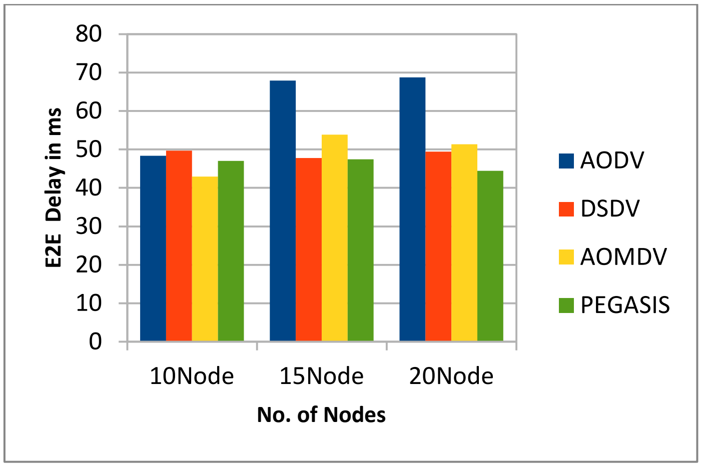
PDR for 10,15, 20 NODES:



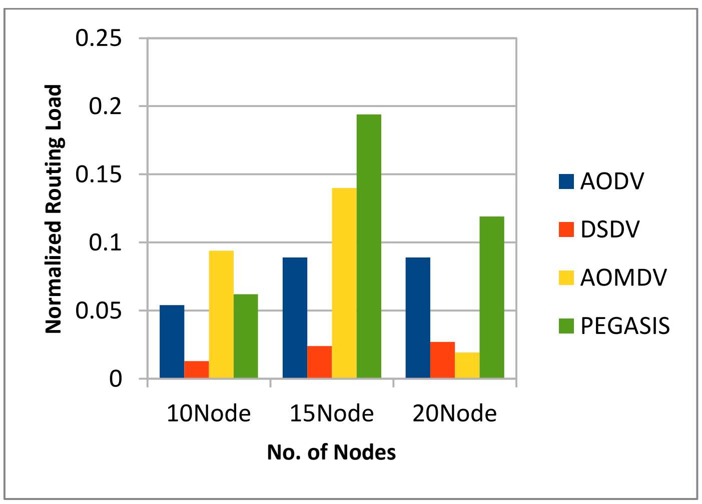
Throghput for 10,15,20 Nodes:



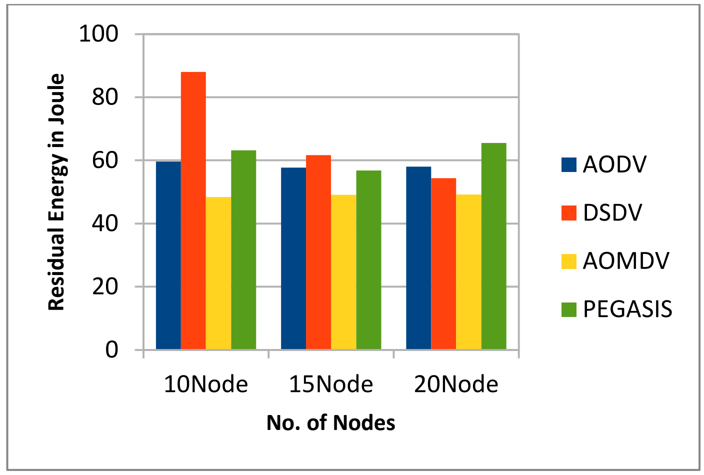
E2E Dealy for 10,15,20 Nodes:



NRL for 10,15,20 Nodes:



Residual Energy for 10,15,20 Nodes:



Analysis of Results: WSN architecture has been implemented with different protocolsand scenario on following parameters:

Energy Consumption: Energy consumption in PEGASIS protocol in all the cases except 15 node is less as compare to AODV,AOMDVand DSDV

E2E Delay: When we look across end to end delay than MAODV having more delay with all the node speed as compared with AODV and DSDV and PEGASIS.

PDR: PDR for all the cases for MAODV under WSN environment is better as compared with AODV and DSDV and PEGASIS

Throughput: Throughput of MAODV routing protocol is better for each mobility model for VANET.

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