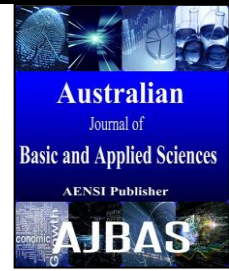




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Review on Lifetime Enhancement with Best Energy Path Using SPAN-AODV Protocol in Caterpillar Network

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ABSTRACT

Wireless sensor networks (WSNs) have been mostly considered with improvements in ubiquitous computing environment. The supply of a sensor node is limited, so it is essential to use energy-efficient routing protocol in WSNs. Energy consumption by nodes in a network has to be reduced as much as possible to drive a network for long time. Energy consumption can be maintained to certain threshold level, so that no individual nodes can go dry beyond that certain level. In this paper, we propose a method to maintain the nodes of caterpillar network that remains alive for long time, which uses energy efficient SPAN-AODV. Here we suggest each node to behave active and idle states, so that average energy level of whole network can be maintained. In proposed method, we will compute the procedure to identify the nodes, which losing its energy earlier than other. We isolate those nodes below threshold energy from communication. Packet transmission has done only through energy nodes, even non energy nodes present at accessible distance to communicate.

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INTRODUCTION

Wireless sensor networks have been largely analyzed in ubiquitous computing environment because of its extensive application. The application area of WSNs includes ecological management, medical services, and military monitoring. WSNs are poised of various sensor nodes furnished with short-range wireless communication, memory and processors. Wireless sensor networks have amply of benefits. The deployment of WSNs is at ease and sooner than the wired sensor networks or any other wireless networks, as they do not need any permanent infrastructure. In the meantime sensor nodes are closely deployed in most of the cases; they are able to tolerate the network failures. The conjoined sensor nodes transmit the sensed data to the central base station, termed as sink node. A routing protocol is a mode of defining a path for sensed data transmission between a source points to an endpoint (i.e., sink node). The proficiency of WSNs is very dependent on routing protocols that has direct impact on network lifetime. The main goal of routing protocols is to improve both lifetime and reliability of WSNs by seeing the ability of a sensor node with resource limitations, such as slow processor, low communication bandwidth and

inadequate power. Therefore, the dispute of routing protocols is to lessen the communication overhead for data transmission by defining a best energy path in WSN.

Taxonomy of Clustering Features In WSNs:

A. Network model:

Various architectures and design goals have been considered for many applications of WSNs. The succeeding procures some of the relevant architectural parameters and highlights their implications on network clustering.

B. Network dynamics:

WSNs consist of three main components: 1.sensor nodes, 2.base station and 3.monitored events. Most of the network architectures say that sensor nodes are stationary [9]. Every so often it is assumed necessary to support the mobility of base-station or CHs. Node mobility is very challenging features in clustering as the node membership will dynamically change. The monitored events of a sensor can be either intermittent or continual that is depending on the application. Here intermittent events allow the network to work in reactive mode whereas continual event makes the cluster stable.

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C. Node deployment:

Nodes are deployed accordingly to fulfill the needs and objectives of any applications. Node deployments are classified as deterministic and self-organizing. In deterministic case the sensor nodes are

deployed manually and so the routing is done along the pre-determined path. In self-organizing schemes, the sensor nodes are dispersed randomly forming an infrastructure in an ad hoc manner (Younis, O., S. Fahmy, 2004).

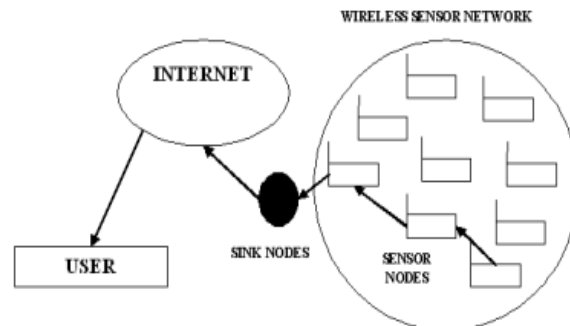


Fig. 1: Wireless sensor network architecture.

D. Cluster head (CH) selection:

In clustering technology more number of nodes can formed into the small groups which is termed as clusters. From this cluster it select one leader called Cluster head (CH). In CH selection the CHs are

selected among the sensor nodes. Various tasks are examined for this selection. The cluster head are left out from sensing responsibilities ,by excluding this duty the CH node can probably consumes energy and wil elude depleting energy quite quickly.

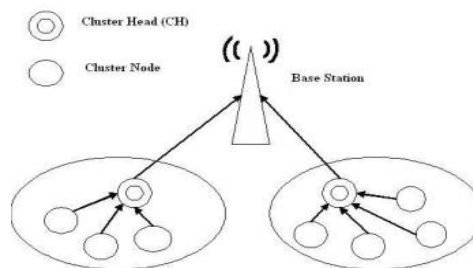


Fig. 2: Clustering techniques.

Problem Statements in Existing Methodology:

Existing method uses MR-Leach (multi hop-routing) for energy efficiency in WSN. In that approach, it uses packet Delivery ratio, distance and no of child nodes as a parameter to elect cluster head among cluster members. Due to this, there is always

a traffic flow exists for contention or selections of cluster head, which require some energy .To determine the best packet delivery ratio, i.e., success rate. The existing approach floods packets throughout the network, these packets could use dummy packets to find PDR.

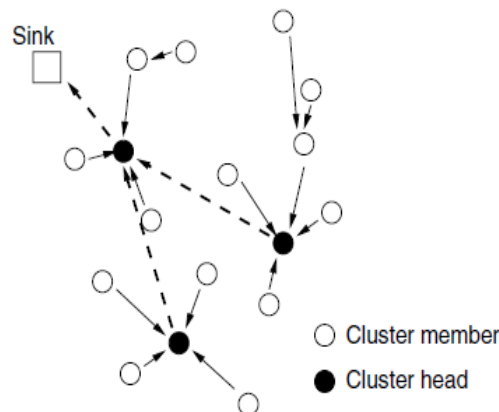


Fig. 3: Existing methodology.

Although, the process of cluster head selection is complex, the process itself consumes energy. Suppose cluster head has been chosen for N set of nodes, then all these N nodes may try to send its packet through selected head causes earlier dry of elected head. So, new cluster head has to be chosen and also the earlier node would die earlier and could not communicate its own data to the network.

Related Work:

To determine energy efficient protocol many researches and survey are made in wireless sensor network. From the results and performance analysis of various researches it has been determined that among the existing protocols, the cluster based routing is predominantly more suitable for uninterrupted data transmission in wireless sensor networks and also in energy conservation. In this section, we exhibit an overview of various works that examine the energy efficient routing protocols and also various methodologies for energy consumption for wireless sensor network along with its limits.

Reena Singh *et al.* propose an EEAODV routing protocol which is a development in the existing AODV routing protocol. EEAODV has enhanced the Route Request (REQ) and Request Reply (RREP) process to handle energy consumption in mobile devices. EE-AODV considers some minimum energy which should be obtainable in the node to be used as an intermediary node. When the energy of a node reaches to or below that level, the node should not be considered as an intermediary node, until and unless no substitute path is available. So, if the best path is available through the intermediate node having less power and source node has one more route as a substitute path to send data. Energy wastage occurs at idle mode of nodes.

Akhilesh Tripathi *et al.* introduce MECB-AODV (Modified Energy Constraint Protocol Based on AODV) which is derivative from AODV protocol. In MECB-AODV protocol, at the intermediate nodes the residual energy is considered to sustain the connectivity of the network as long as possible. Being a Proactive protocol it consumes high bandwidth.

Farooq *et al.* proposed a multi hop routing with low energy adaptive clustering hierarchy (MR-LEACH). The MR-LEACH protocol chose the Cluster headers and the aggregated data are transmitted to a sink node by using multi hop routing. Therefore, it attains substantial enhancement on energy consumption, compared with the LEACH protocol. The problem of MR-LEACH is that the selection of a cluster header in a layer exclusively depends on the residual energy of a sensor node,

rather than considering the distances among cluster headers.

Proposed Methodology:

SPAN-AODV:

Our proposed method uses energy efficient SPAN-AODV approach for energy efficiency. Since this protocol finds shortest path by on demand routing protocol and this is added with residual energy and hence, lifetime of nodes is increased. This approach takes the advantage of both shortest path and best energy efficient path. Unlike MR-Leach there is no contention for cluster head selection, it does not add additional traffic to network. For N set of nodes, here it is not necessary that single node should act as cluster head and all packets of neighbors must pass through it. In proposed method, we will compute the procedure to identify the nodes, which losing its energy earlier than other. We isolate those nodes below threshold energy from communication. Packet transmission has done only through energy nodes, even non energy nodes present at accessible distance to communicate.

Performance Analysis and Simulation Result:

In our research we compare the performance of our proposed SPAN-AODV routing protocol with MR-LEACH. The main parameters we consider here are amount of residual energy, network delay and also traffic size. By the result of simulation we prove that our proposed protocol out performs the existing protocols. The analysis and simulation results given below explains that SPAN-AODV out performs MR-LEACH in terms of various parameter but here only few parameters are considered.

While considering residual energy, the energy at proposed protocol is high while compared to MR-LEACH. The energy reduction is gradually low thus residual energy is high at SPAN-AODV. Until this energy is maintained the lifetime of network is sustained. Hence overall network life time is increased in our proposed method than existing methodologies.

When considering the traffic size and network delay our proposed SPAN-AODV has low delay and traffic than existing methodology. As the delay time is low the transmission of data along the network is high. Some amount of energy is wasted due to this delay in transmission and this can be avoided by reducing traffic size. The distance also influences delay and energy consumption which can be tackled by means of choosing best energy path. Thus in terms of traffic size and delay are highly low in SPAN-AODV than MR-LEACH.

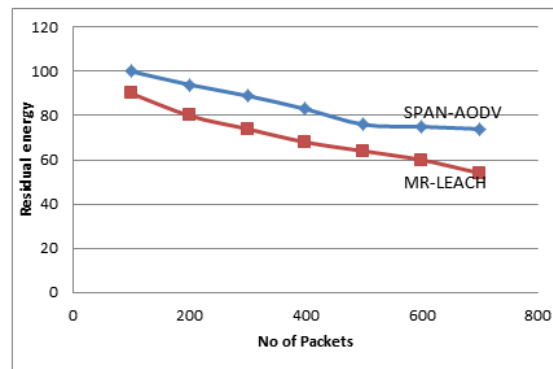


Fig. 4: Residual energy of our proposed SPAN-AODV and MR-LEACH.

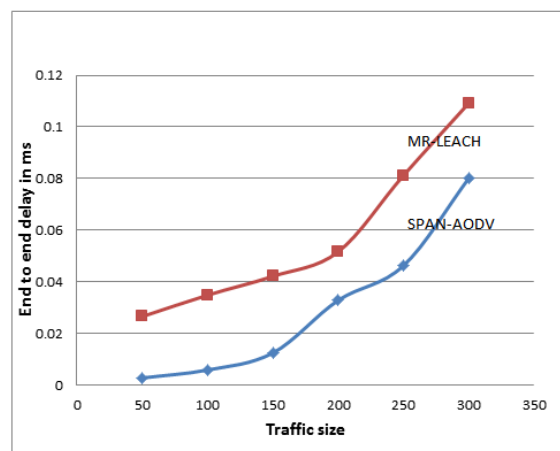


Fig. 5: Network delay and Traffic of our proposed SPAN-AODV and MR-LEACH.

Conclusion:

The paper hereby concludes the survey for enhancing network lifetime in wireless sensor network by implementing SPAN-AODV routing protocol. SPAN-AODV creates backbone network to forward message and maintains hop positions. From our performance analysis, we show that SPAN-AODV routing protocol outperforms the existing protocols, in terms of energy efficiency, network life time, traffic size and network delay.

As a future work the proposed method is implemented to Caterpillar network and in caterpillar network, we propose to split the single packets to multiple packets those packets can travel through more number of nodes, which significantly reduces the particular node to run out from its energy and also provides fast delivery of packets.

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