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RESEARCH ARTICLE

AN ADAPTIVE ENERGY MANAGING ROUTING PROTOCOL TO IMPROVE ENHANCED THROUGHPUT IN WSN

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ABSTRACT: Wireless Sensor Networks (WSNs) have emerged as research areas with an overwhelming effect on practical application developments. The aim of the project is to improve the link stability in distributed wireless network. In this research to propose OLSR, that inherits stability of Link-state protocol. Only selective flooding are done and also only MPR retransmit control messages and it has minimize flooding suitable for large and dense networks. In multipoint relay, MPRs is indicated as set of selected neighbor nodes. Minimize the flooding of broadcast packets. Each node selects its MPRs among its on hop neighbors. The set covers all the nodes that are two hops away. MPR Selector can be the node which has selected node as MPR. The information required to calculate the multipoint relays: The set of one-hop neighbors and the two-hop neighbors. Set of MPRs is able to transmit to all two-hop neighbors. Link between node and it's MPR is bidirectional. That propose the system for to high performance of the wireless network through the link stability (OLSR) concept use of the routing algorithm. The issues are scalability to large number of nodes, design of data handling techniques, localization techniques, real time communication, data availability, fault tolerance etc.

Keywords: Mobile Computing, CSMA, MPR, OLSR

1. INTRODUCTION

Mobile Computing is human computer interaction by which a computer is expected to be transported during normal usage. Mobile computing involves mobile communication, mobile hardware, and mobile software. Communication issues include ad hoc and infrastructure networks as well as communication properties, protocols, data formats and concrete technologies. Hardware includes mobile devices or device components. Mobile software deals with the characteristics and requirements of mobile applications. Mobile Computing is "taking a computer and all necessary files and software out into the field". Mobile computing is any type of computing which use internet or intranet and respective communications links, as WAN, LAN, WLAN etc. Mobile computers may form a wireless personal network or a piconet.

2. LITERATURE SURVEY

L. Jiang and J. Walrand In this paper, proposed a distributed CSMA scheduling algorithm, and showed that, under the model of perfect CSMA, it is throughput-optimal in wireless networks with a general interference model. Utilized the product-form stationary distribution of CSMA networks in order to obtain the distributed algorithm and the maximal throughput .Furthermore, it combined that algorithm with end-to-end flow control to approach the optimal utility, and showed the connection with maximal backpressure scheduling. The algorithm is easy to implement, and the simulation results are encouraging. The adaptive CSMA algorithm is a modular MAC-layer protocol that can work with other algorithms in the transport layer and network layer. It also considered some practical issues when implementing the algorithm in an 802.11 setting. Since collisions occur in actual 802.11 networks, a few recent algorithms which explicitly consider collisions and can still approach throughput-optimality .Our current performance analysis of algorithm is based on a separation of time scales, i.e., the vector r is adapted slowly to allow the CSMA Markov chain to closely track the stationary distribution $p(r)$. The simulations, however, indicate that such slow adaptations are not always necessary. In the future, to understand more about the case without time-scale separation.

3. METHODOLOGY

3.1 Link Stability Concept

In this research to propose a high performance of the wireless network through the link stability (OLSR) concept use of the routing algorithm .Routing algorithms calculate the best path per destination in a distance vector or link-state basis. In a distance vector protocol, optimality is computed incrementally along a path. Sensors calculate routes locally, based on their current, partial network state. They iteratively notify their neighbors of intermediate results until routing tables stabilize – if a different best path exists, they employ it. In link-state protocols, on the other hand, every sensor contributes to establish a replicated distributed database of the network topology. Then, sensors run a shortest path algorithm (e.g. Dijkstra's algorithm) over this topology database instance. Distance vector protocols appear suitable for wireless sensor networks. First, sensor systems react to environmental stimuli, thus they acquire paths on demand. Second, the in-network processing model entails an incremental packet delivery. Finally, sensors usually propagate their measurements to one aggregation point. A single distributed tree structure is sufficient to support this many-to-one traffic model. As a result of these characteristics, the trend in sensor network routing has been towards distance vector algorithms, augmented by query-driven application models. The replicated database model appeals to stationary sensor systems. By default, link-state protocols are more robust to network changes, they have sufficient state to route packets around broken links. Furthermore, sensors are usually immobile, or they move infrequently. Thus, they do not experience the thrashing of routing tables seen in mobile ad hoc networks. Management traffic is often overlooked. Management traffic is often overlooked. Sensors may also accept re-configuration commands, software updates, or complete binary images from an authority external to the network. Given one or more access points, proactive protocols can promptly address an arbitrary set of nodes for administrative tasks. The goal is to minimize transmissions by eliminating data redundancy, if present, during the collection process.

In a similar manner, location-aware protocols utilize the relationship between sensors and the physical world to propagate packets according to absolute or relative geographic coordinate systems. The two basic mechanisms of a routing protocol are neighbor discovery, to discover and maintain connectivity with peers, and flooding, to disseminate network state to distant nodes. Peer sensors exchange messages periodically to assert link liveness locally, within radio range. They flood local state to assert global knowledge of the network topology. Sensors utilize this local and global routing state to decide on best paths. The routing state traverses the network as control packets. There is a constant tension between the energy, memory, and bandwidth constraints within a sensor and the amount of routing state maintained by the protocol. The efficiency of the routing protocol is improved if more state is maintained, at the expense of increased utilization of the system resources.Each node discover all the links with its neighbor nodes. Each node periodically floods a message containing all its afferent links (Link State Message). Each node constructs a topology map of the network, in the form of a graph. Each node then independently calculates the best next hop for every other nodes in the network using a shortest-path algorithm. Each node selects own set of multipoint relays, Multipoint relays are declared in the transmitted HELLO messages.

Multipoint relay set is re-calculated when: A change in the neighborhood (neighbor is failed or add new neighbor). A change in the two-hop neighbor set. Each node also constructs its MPR Selector table with information obtained from the HELLO message. A node updates its MPR Selector set with information in the received HELLO messages. Each node selects a subset of nodes in its neighborhood, which retransmits its messages these selected nodes are named Multi Point Relays (MPRs) of that node, the selection condition is the following: each two hop neighbor node must have at least one bidirectional link toward a node inside the MPR set. So the MPR nodes must permit to reach all the two hop neighbors. A node retransmits a received message only if it's part of the MPRs set of the neighbor node that has transmitted the message. So, each node maintain a list of the nodes from which has been selected as MPR. This set is called MPR Selectors. Each node retransmits only the messages received from the nodes inside its MPR Selectors set. For Cluster Head Selection, Hybrid of residual energy (primary) and communication cost (secondary) such as node proximity, Number of rounds of iterations, Tentative CHs formed, Final CH until CH_{prob} =1. Same or different power levels used for intra cluster communication. Assigned Cluster heads collect the recorded information from the sensor nodes and perform filtering upon raw data and forward the filtered information to the appropriate "Ingress Node".

Cluster Head Selection Algorithm:

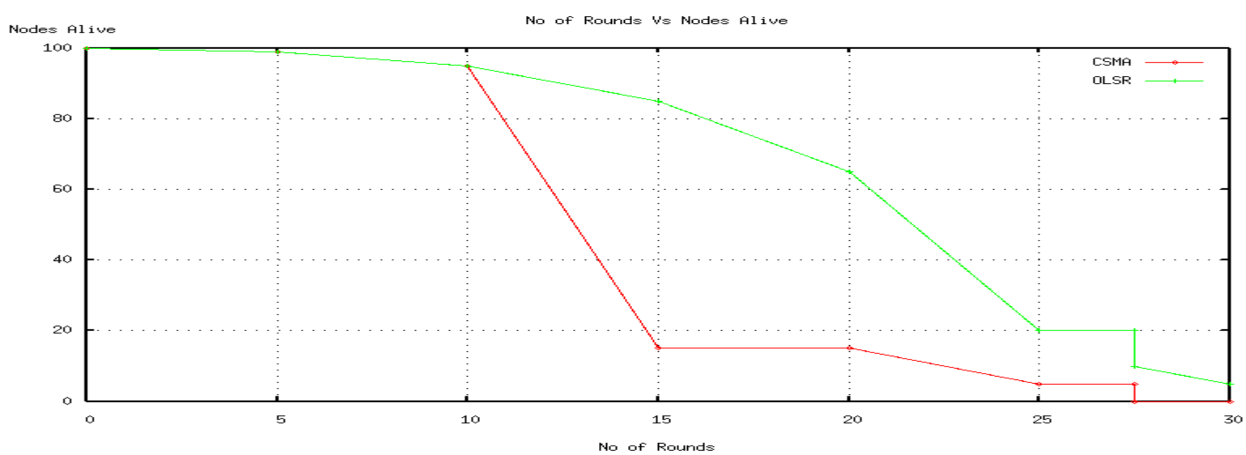
$$E\left[\sum_{i=1}^{N} C_i(t)\right] = N - k * \left(r \bmod \frac{N}{k}\right)$$

$\sum_{i=1}^{N} C_i(t)$ = total no. of nodes eligible to be a **cluster-head** at time *t*. This ensures energy at each node to be approx. equal after every N/k rounds. Expected no of Cluster Heads per round is,

$$\begin{aligned} E[\#CH] &= \sum_{i=1}^{N} P_i(t) * 1 \\ &= \left(N - k * \left(r \bmod \frac{N}{k}\right)\right) * \frac{k}{N - k * \left(r \bmod \frac{N}{k}\right)} \\ &= k. \end{aligned} \quad (5)$$

4. EXPERIMENTS AND RESULTS

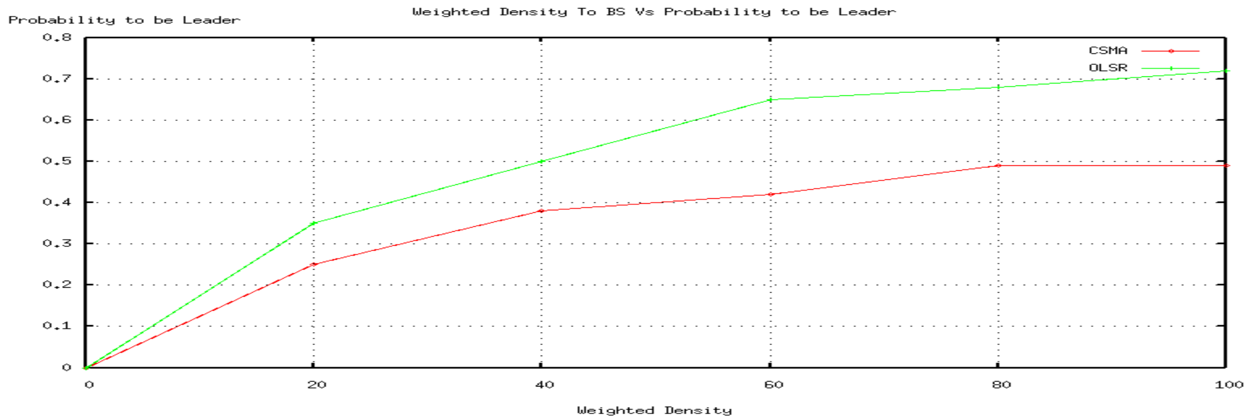
This section presents the experimental result with graphs indicating the comparison of proposed system with CSMA. It describes the evaluation of number of rounds and the number of alive node in the system.



Number of rounds Vs Number Node Alive

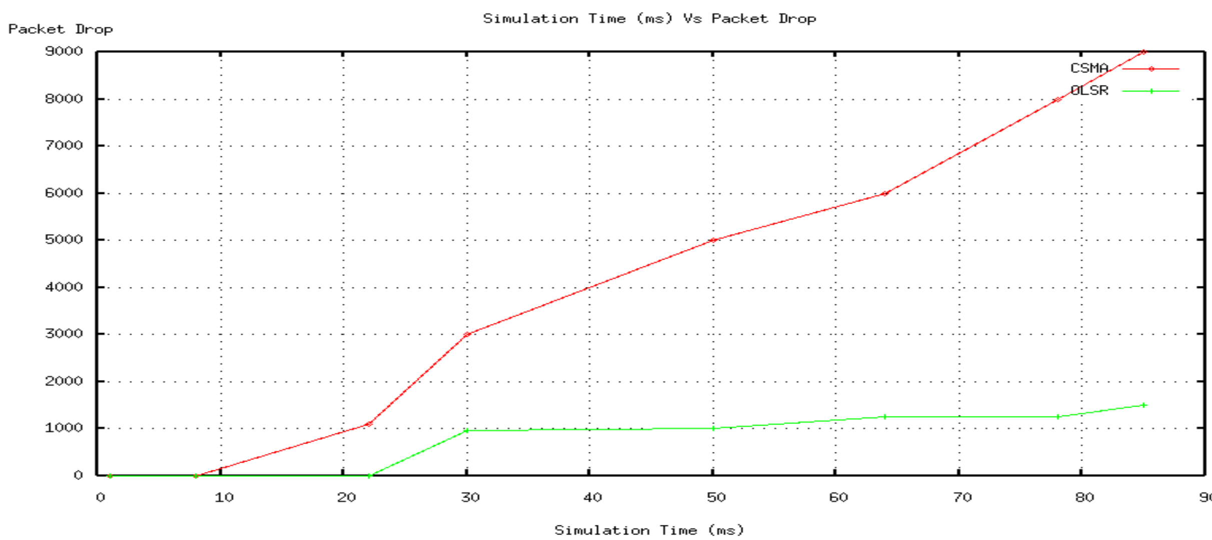
The cost of carrier-sensing increases with respect to sleeping, the nodes need to sense the channel less frequently to minimize energy consumption per bit, so the energy-optimum rate and throughput Reduces. When compare with existing CSMA method, the proposed routing algorithm perform well.

This section presents the experimental result with graphs indicating the comparison of proposed system with CSMA. It describes the evaluation of weighted density and probability. The probability of proposed system in this comparison is high when compare with CSMA.



Weighted Density to BS Vs Probability to be leader

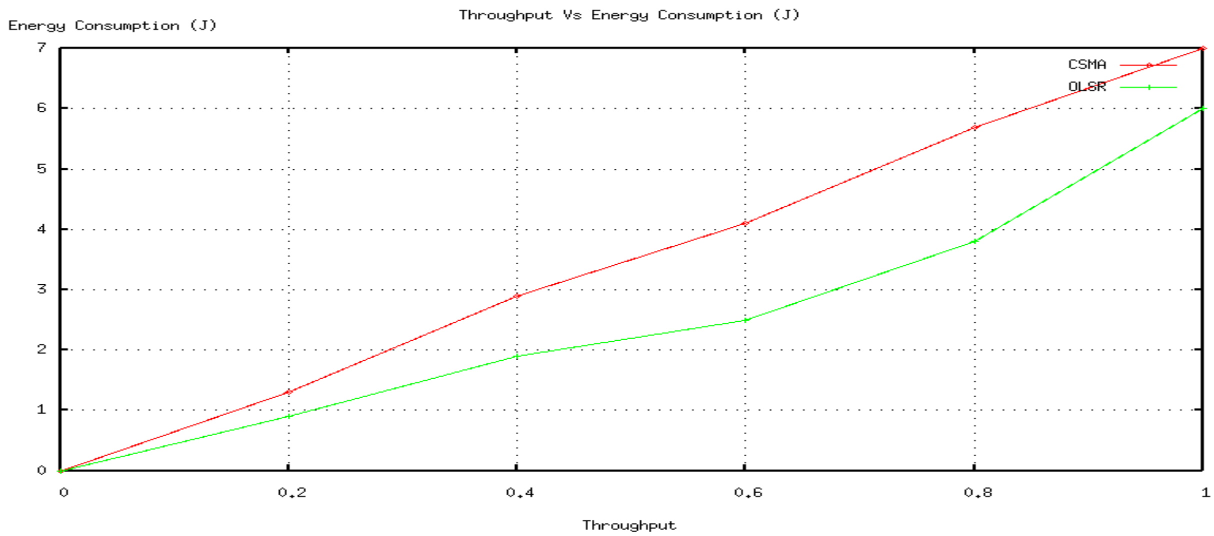
This section presents the experimental result with graphs indicating the comparison of proposed system with CSMA. It describes the evaluation of simulation time and packet drop during the process. The system work well when compared with the current models.



Simulation Time Vs Packet Drop

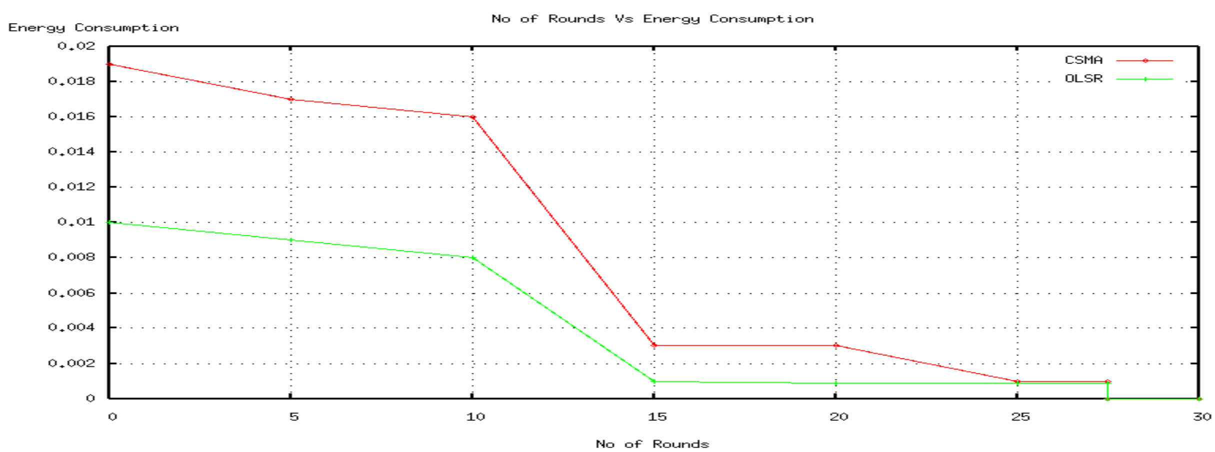
This section presents the experimental result with graphs indicating the comparison of proposed system with CSMA. It describes the evaluation of throughput and energy consumption.

It presents the total energy consumption as the total throughput in the network increases.



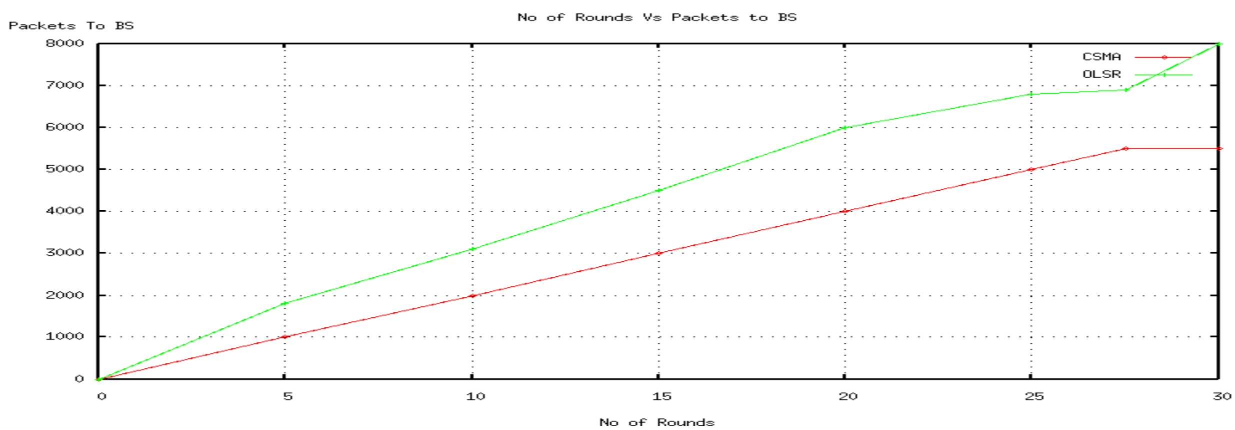
Throughput Vs Energy Consumption

This section presents the experimental result with graphs indicating the comparison of proposed system with CSMA. It describes the evaluation of number of rounds and energy consumption. Energy consumption rate is high when compared with the CSMA method.



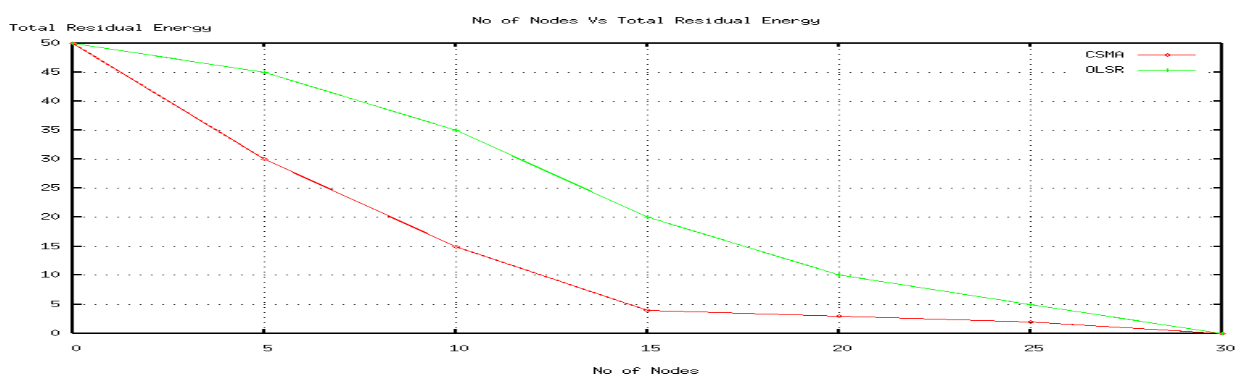
Number of Rounds Vs Energy Consumption

This section presents the experimental result with graphs indicating the comparison of proposed system with CSMA. It describes the evaluation of packets to Bs with the number of round and its function.



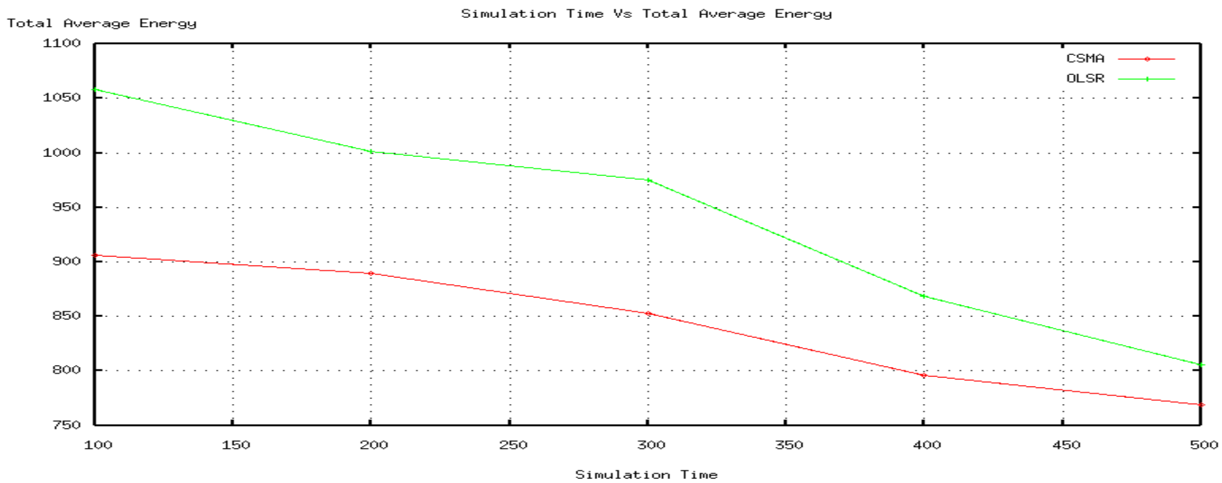
Number of Rounds Vs Packet to the Bs

This section presents the experimental result with graphs indicating the comparison of proposed system with CSMA. It describes the evaluation of nodes with the residual energy.



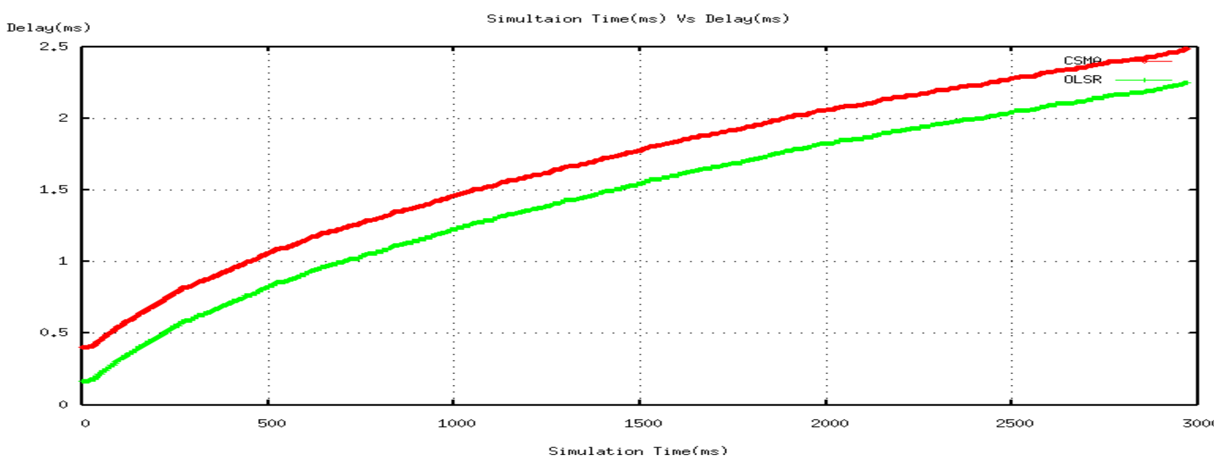
Number of nodes Vs Total Residual energy

This section presents the experimental result with graphs indicating the comparison of proposed system with CSMA. It describes the evaluation of simulation time with average energy. We performed simulations to compare the energy consumption of both protocols. As the simulation time increases total average energy also increases, this makes the proposed system to work better than all other current system available.



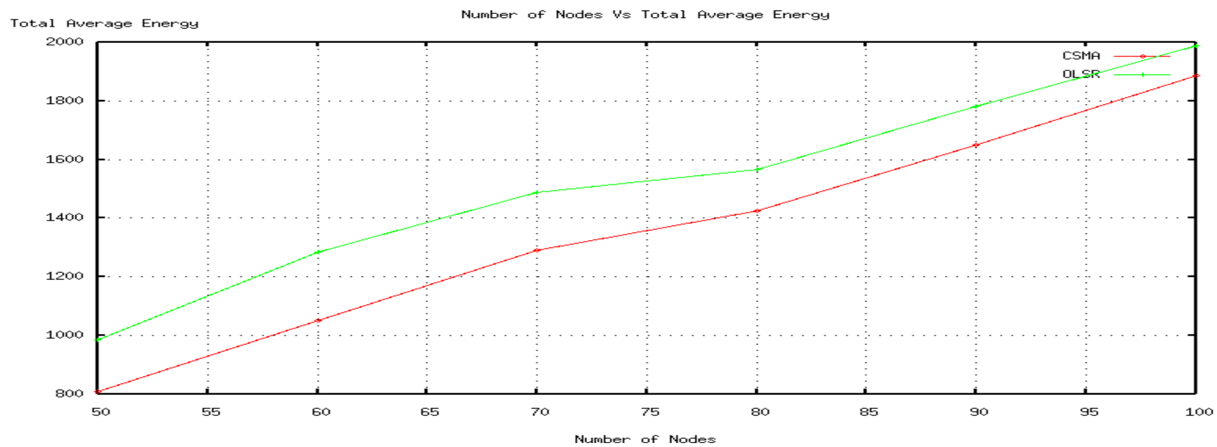
Simulation Time Vs Total Average Energy

This section presents the experimental result with graphs indicating the comparison of proposed system with CSMA. It describes the evaluation of simulation time with the delay.



Simulation Time Vs Delay

This section presents the experimental result with graphs indicating the comparison of proposed system with CSMA. It describes the evaluation of number of nodes with its average energy level. The proposed system works better saving total average energy.



Number of nodes Vs Total Average Energy

5. CONCLUSION AND FUTRUE ENHANCEMENT

The system for to high performance of the wireless network through the link stability (OLSR) concept use of the routing algorithm. The issues are scalability to large number of nodes, design of data handling techniques, localization techniques, real time communication, data availability, fault tolerance etc. The proposed system is simple, secured and adaptive energy efficient link based algorithm in WSN. For that, used Dynamic routing algorithm for selection reliable path for energy efficiency and performance. Dynamic routing is a networking technique that provides optimal data routing. This system is proposed to achieve trade-off of energy consumption and time delay. Sensors send their measurement to a subset of sensors called relay points (RPs) by multi-hop communication. A sink moves around in the network and retrieves data from encountered RPs. RPs are static, data dissemination to RPs is equivalent to data dissemination to static sinks. Simulation results have proven that proposed approach outperforms when compared with the previous schemes. Ultimate objective behind the routing protocol is to keep the sensor operating as far as possible, thus extending the network lifetime.

OLSR is a proactive routing protocol for mobile adhoc networks (MANETs). OLSR uses a concept of MPR [Multi-Point Relay] selection mechanism to reduce broadcast packets during a flooding process. OLSR does not consider available node energy and mobility of nodes for path selection and communication purposes. Future investigation is to avoid selecting MPR nodes which has small residual energy and concentrating energy consumption in specific nodes by using weighted MPR approach. Weighted MPR is calculated using Residual Energy, Transmission Delay and Signal Strength.

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