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RESEARCH ARTICLE

RELIABLE ENERGY AWARE ROUTING PROTOCOL FOR HETEROGENEOUS WSN BASED ON BEACONING

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ABSTRACT: ***An efficient routing protocol can make heterogeneous WSN better to provide a reliable and energy efficient connectivity between nodes and the sink. When designing a routing protocol for heterogeneous. For efficient switching clock rate and to increase network robustness the system introduces 802.11 standard protocols. A C-MAC is introduced; it may be a feasible approach to prolong the network lifetime, yet maintaining the network connectivity. CMAC first uses any cast to wake up forwarding nodes, and then converges gradually from route-suboptimal any cast with unsynchronized duty cycling to route-optimal unicast with synchronized scheduling. Energy-balanced routing protocol, forwards data packets toward the sink through dense energy areas so as to protect the nodes with relatively low residual energy. The protocol is optimized dynamically by a constrained optimization problem. The objective function is the total energy consumption for transmitting and receiving packets from the edge cluster to the sink. Proposed to use a set of sub-optimal paths occasionally to increase the lifetime of the network. Motivated by the limitations of current approaches, propose a new MAC layer protocol called Convergent MAC (CMAC) that supports low latency and high throughput as well as low duty cycle operation. Simulation result illustrates the efficiency of the proposed system compared to algorithm developed for sensor network.***

Keywords: Mobile Computing, CMAC, 802.11, MANET, MAC

1. INTRODUCTION

Mobile computing is human computer interaction by which a computer is expected to be transported during normal usage. Mobile computing offers significant benefits for organizations that choose to integrate the technology into their fixed organizational information system. Mobile computing is made possible by portable computer hardware, software, and communications systems that interact with a non-mobile organizational information system while away from the normal, fixed workplace. Mobile computing is a versatile and potentially strategic technology that improves information quality and accessibility, increases operational efficiency, and enhances management effectiveness. Mobile Ad-hoc networks (MANET) are self configuring and self-organizing multi hop wireless networks where, the network structure changes dynamically. In a MANET nodes (hosts) communicate with each other via wireless links either directly or relying on other nodes as routers. The nodes in the network not only acts as hosts but also as routers that route data to/from other nodes in network The operation of MANETs does not depend on preexisting infrastructure or base stations. Network nodes in MANETs can move freely and randomly.

2. LITERATURE SURVEY

Heinzelman W. Chandrakasan A. Balakrishnan H. The simulations show that: (i) LEACH reduces communication energy by as much as 8x compared with direct transmission and minimum- transmission-energy routing. (ii) The first node death in LEACH occurs over 8 times later than the first node death in direct transmission, minimum-transmission-energy routing, and a static clustering protocol, and the last node death in LEACH occurs over 3 times later than the last node death in the other protocols. Providing such a low-energy, ad hoc, distributed protocol will help pave the way for future micro sensor networks. Meenakshi Sharma, Kalpana Sharma EEE LEACH or Energy Efficient Extended LEACH is an approach of multilevel clustering technique to increase energy efficiency by reducing its radio communication distance. In this multilevel clustering approach besides having a single layer of clusters formation between the nodes and Base station like LEACH, it involves two layers of clusters formation. In the first layer CHs are formed where the normal nodes transmit their own data to their respective CH and by using the fuse mechanism the CHs aggregate the received data. Arezoo Yektaparast,

Fatemeh-Hoda Nabavi, Adel Sarmast, and Wireless sensor network is a wireless network consisting of independent sensor, communicating with each other in distributed fashion to monitor the environment. Sensors are usually attached to microcontroller and are powered by battery. The goal of Wireless sensor network is to have long life time and high reliability with maximum coverage. Routing techniques are the most important issue for networks where resources are limited. LEACH is one of the first hierarchical routing approaches for sensor networks. Most of the clustering algorithms are derived from this algorithm. In this paper we propose an improvement on the LEACH Protocol. In our proposed algorithm, every cluster divided into 7 subsections that are called cells. Also every cell has a cell-head. Cell-heads communicate with cluster-heads directly.

3. METHODOLOGY

3.1 CMAC

Proposed a MAC layer protocol called Convergent MAC (CMAC) that supports low latency and high throughput as well as low duty cycle operation. CMAC has three main components: Aggressive RTS equipped with double channel check for channel assessment, any cast to quickly discover forwarder, and convergent packet forwarding to reduce the any cast overhead. In this section, firstly an overview on how CMAC works is given, and then the detailed design of CMAC follows.

3.1.1 CMAC Overview

When there is no traffic in the network, CMAC uses unsynchronized wake-up scheduling with a pre-defined idle duty cycle (i.e., the duty cycle followed by nodes when there is no traffic). In this wake-up scheduling scheme, the duration between successive wake-ups is fixed according to the duty cycle and active period. However, to make the following mechanisms work at expected performance, we evenly randomize the wake-up time of each node for the first times it goes back to sleep after receiving a packet. While transmitting packets, the transmitter uses aggressive RTS instead of a long preamble to activate the receiver. To detect aggressive RTS, nodes periodically wake up and “double check” the channel for activities. Unlike other unicast MAC layer protocols, CMAC initially uses any casts to transmit packets to a potential forwarder that wakes up first. Awake candidate receivers will contend to be the any cast receiver by

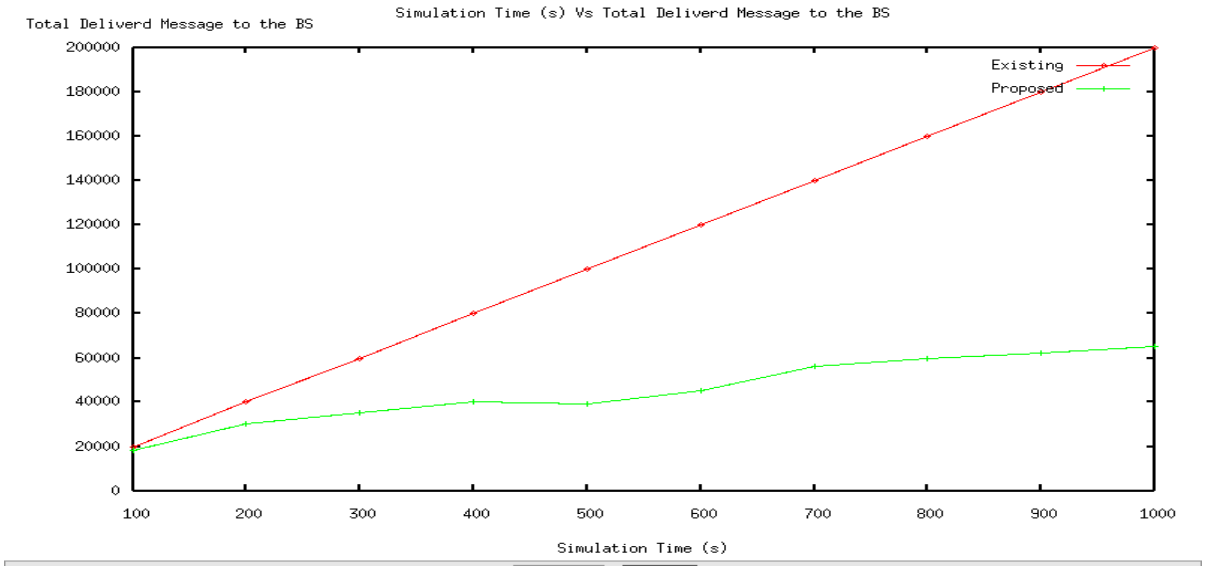
prioritizing their CTS transmissions according to their routing metrics to the sink. After receiving a CTS, the data packet will be sent to the sender of the CTS immediately. Nodes will keep their radios "on" for a short duration anticipating more packets whenever they successfully receive data packets destined to them. This reduces the overhead of searching for awake forwarders in subsequent transmissions.

Motivated by the limitations of current approaches, we propose a new MAC layer protocol called Convergent MAC (CMAC) that supports low latency and high throughput as well as low duty cycle operation. An C-MAC may be a feasible approach to prolong the network lifetime, yet maintaining the network connectivity. Energy-balanced routing protocol, forwards data packets toward the sink through dense energy areas so as to protect the nodes with relatively low residual energy. The metric is measured as the percent of energy consumed by a node with respect to its initial energy. The initial energy and the final energy left in the node, at the end of the simulation run are measured. The percent energy consumed by a node is calculated as the energy consumed to the initial energy. And finally the percent energy consumed by all the nodes in a scenario is calculated as the average of their individual energy consumption of the nodes. The metric is measured as the percent of energy consumed by a node with respect to its initial energy. The initial energy and the final energy left in the node, at the end of the simulation run are measured. The percent energy consumed by a node is calculated as the energy consumed to the initial energy.

Percent Energy consumed =[(Initial Energy –Final Energy)/Initial Energy]*100 Average_Energy_consumed=Num_of_precent_Energy_consumed_by_All_Nodes/Num_of_Nod es Residual_Energy=total_energy_given_to_all_nodes-Sum_of_energy_consumed_by_all_nodes To allow nodes to work at a very low duty cycle, nodes must assess the channel very quickly each time they wake up. However, if the receiver wakes up during the gap between two RTS transmissions, it may miss this RTS burst. So we propose to use double channel check which works by assessing the channel twice with a fix short separation between them each time a node wakes up. For each channel check, nodes sample the channel for up to 5 times. Between these two channel checks, the radio could be put to sleep mode to save energy. If the first check detects a busy channel, the second check will be canceled. Otherwise, the second check is performed. The positive conclusion on busy channel from either check will keep the node awake anticipating an RTS.

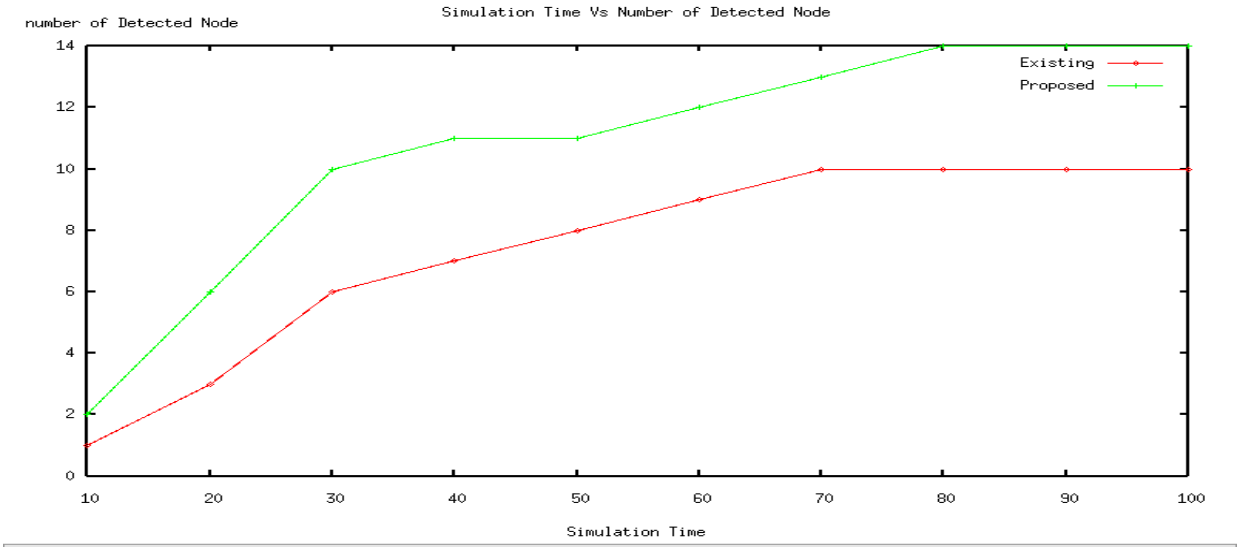
4. EXPERIMENTS AND RESULTS

This result shows that how many messages or packets are received by the base station and it is compared with the existing one.



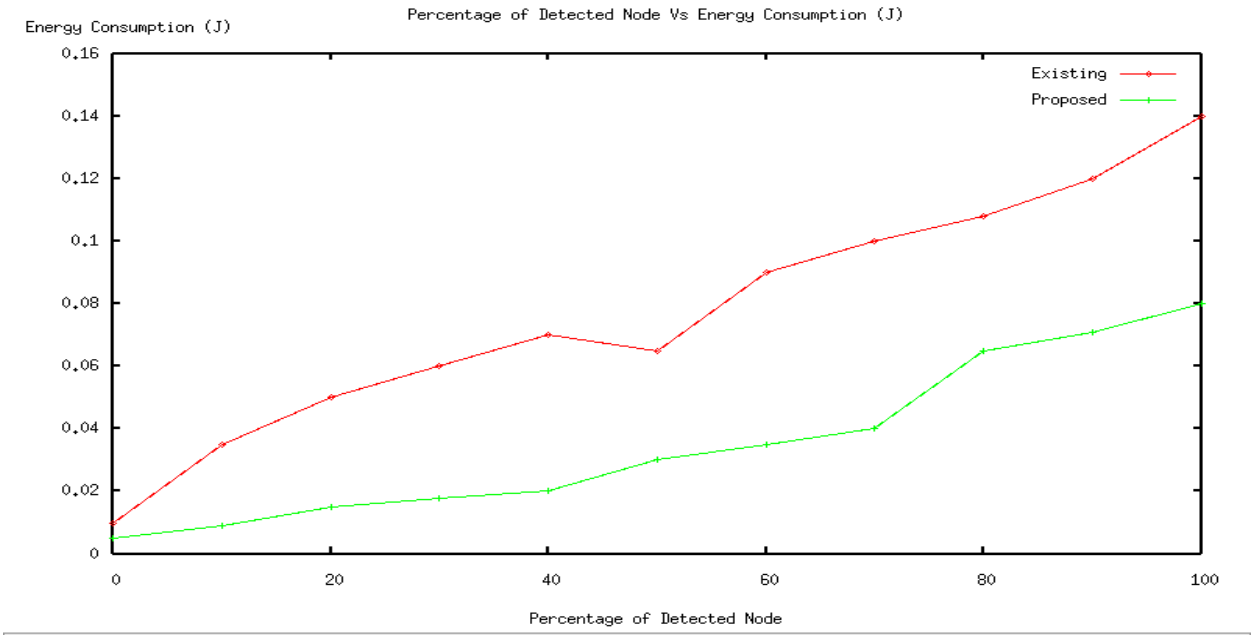
Simulation Time Vs Total Delivered Message To The Bs

The following graph shows that Number of trusted nodes detected for the particular time and the comparison of existing & proposed system.



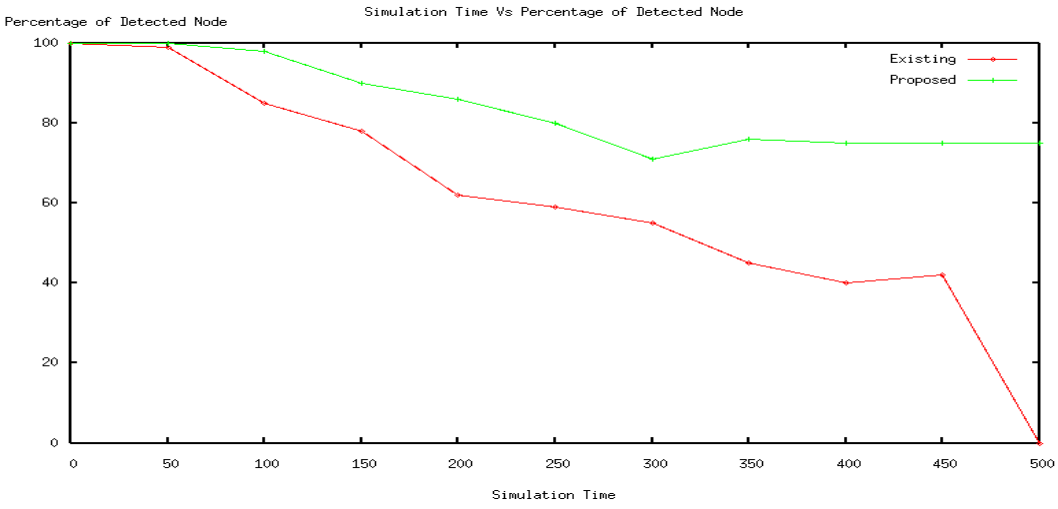
Simulation Time Vs No Of Detected Node

Energy consumed by the available or detected nodes in the network for the existing system and proposed system as shown in the following figure



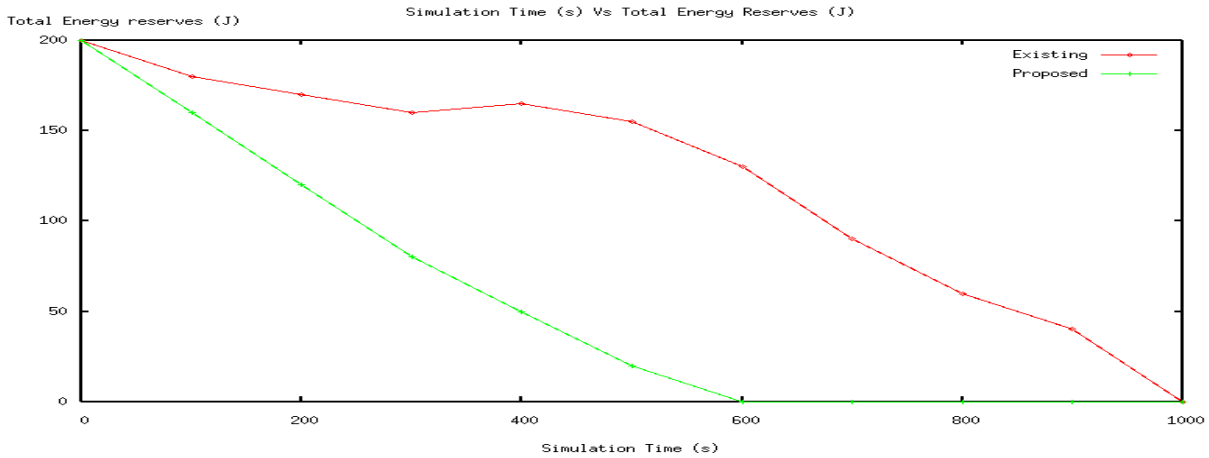
Percentage of Detected Node Vs Energy Consumption (J)

Following graph shows that the number of detected nodes in the proposed Vs existing for a particular time.



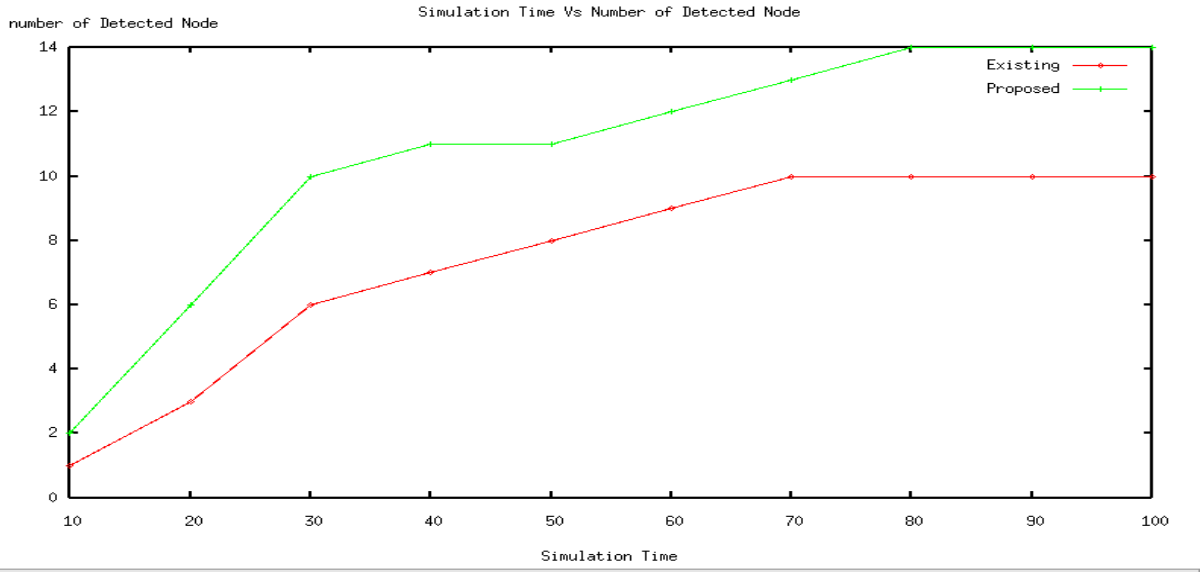
Simulation Time Vs Percentage Of Detected Node

Remaining energy contained or reserved by the Nodes in the existing and proposed system for the particular time as shown below.



Simulation Time Vs Total Energy Reserves

For efficient switching clock rate and to increase network robustness the system introduces 802.11 standard protocols. A C-MAC is introduced; it may be a feasible approach to prolong the network lifetime, yet maintaining the network connectivity. Energy-balanced routing protocol, forwards data packets toward the sink through dense energy areas so as to protect the nodes with relatively low residual energy.



Simulation Time Vs Number Of Detected Node

In our simulations, we evaluate a CMAC variant using a staggered scheduling similar to DMAC after convergence. When the transmitter intends to converge from any cast to unicast, it synchronizes its schedule with the receiver. The two nodes will maintain the staggered schedule as long as there is traffic between them. After certain duration without traffic, the nodes go back to using unsynchronized duty cycling.

5. CONCLUSION AND FUTRUE ENHANCEMENT

Motivated by the limitations of current approaches, we propose a new MAC layer protocol called Convergent MAC (CMAC) that supports low latency and high throughput as well as low duty cycle operation. The protocol is optimized dynamically by a constrained optimization problem. The objective function is the total energy consumption for transmitting and receiving packets from the edge cluster to the sink. Proposed to use a set of sub-optimal paths occasionally to increase the lifetime of the network. The experiment and simulation results show that CMAC at low duty cycles can achieve comparable throughput and latency performance as fully awake CSMA protocol, while greatly outperforming other energy efficient protocols like BMAC, SMAC and GeRaF. Hence, we conclude that CMAC is highly suitable for wireless sensor networks that require low latency and high throughput as well as long network lifetime. The following are the s results to our simulation study; the results are recording in terms of: Average Energy Consumption, Total Energy Consumption, and Residual Energy. Proposed a Location based Energy Aware Reliable routing protocol (LEAR) for WSN based on sensor position and clustering. Clustering based routing protocols are more useful in the context of energy efficiency where several sensor nodes in the communication range of one another form a cluster. Each cluster has a cluster head (CH), which coordinates all the nodes of a cluster. There may be a number of base stations (BS) also known as sink in a WSN that communicate with other networks. In addition, planned to propose a protocol which contains Location based energy-aware reliable routing by implementing clustering with security such as secured routing for packet transmission can be implemented and improve quality of service by adding Qos parameters.

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