Progressive Sleep Scheduling for Energy Efficient Wireless Sensor Network

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Abstract- Increasing the network efficiency & reducing the power consumption are important issues in the design of applications & protocols for wireless sensor network. Sleep scheduling & routing protocol provides efficient communication with less power consumption. In this paper, we address the routing protocol for static network which reduces the computation time & power consumption. Proposed system, in practice, suitable for small & medium sized networks. In this proposed work the first module incorporates the communication between node to node & node to base station.

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I. INTRODUCTION

Wireless Sensor Networks (WSNs) technology is being used widely for monitoring and controlling applications. Various low power, and low cost, small-sized sensors nodes are available which can be readily deployed to monitor environment over vast areas. Wireless sensor network based surveillance systems for remote deployment and control are more cost effective and are easy to deploy at location of interest. They can even reach those areas where satellite signals are not available. Moreover, they can be configured to monitor large areas and they have secure mode of data transmission.

In this paper, we address the problem of power consumption & computing time under sleep scheduling & routing. We consider a sensor network that is deployed in a forest to monitor some events. A lot of research has been done using WSN for forest monitoring either for fire prevention or for monitoring the illegal logging activity. Some researchers have proposed algorithms for detection and prevention and have simulation results verifying their control. On the other hand, some have come up with the design, implementation and deployment of the system. A wireless sensor network (WSN) consists of spatially distributed autonomous sensors to monitor physical or environmental conditions such as temperature, sound, pressure, intruders etc., and to cooperatively pass the data through the network to exact location. As sensor nodes for event monitoring are expected to work for a long time without recharging the batteries, sleep scheduling method is always used during the monitoring process. Recently, many sleep schedules for event monitoring have been designed. Also we proposed a routing protocol which collect the data from sensor node & send this data to the base station within less computation time. For this purpose, various time schedules are arranged for different routing path according to topology used.

In wireless sensor networks, sensor nodes generally switch between active and sleep modes in medium access control (MAC) layer to reduce energy consumption. In most of synchronization protocols, each node begins to synchronize the active/sleep schedule with other nodes at the network setup phase and maintains the synchronization even if it has no packet to send. Therefore, the control overhead and energy consumption during synchronization can not be ignored under low traffic. In this paper, we propose a new active/sleep schedule synchronization protocol in the MAC layer. In our proposed method, each node synchronizes with its neighbors only when it has a packet to send. In addition, our protocol considers clock skew between nodes to maintain the synchronization for a longer period and reduce the number of control packet transmissions. We also study the advantages of our proposed method by introducing computer simulation results.

II. SOME EFFICIENCY ENHANCEMENT TECHNIQUES

Most of the technique focuses on the minimization of power/energy consumption & maximization of network lifetime. In [1] proposed a novel centralized mechanism for near optimal state assignment to sensors in large scale cluster based monitoring wireless sensor networks.

Author mechanism is based on tabu algorithm that computes a near-optimal network configuration in which each sensor can be activated, put in sleep mode or promoted as cluster head. Author mechanism maximizes network lifetime while ensuring the full coverage of the monitored area and the connectivity of the obtained configuration.In [2] proposed system investigated the problem of maximizing the network lifetime of a broadcast session over a wireless static adhoc network, where network is constrained with limited battery energy resource.In [4] author propose Energy Efficient Cluster Head Selection Protocol in Mobile Wireless Sensor Network (EECHS-MWSN). The cluster-head nodes are selected from the residual energy, lowest mobility factor an density of the node. It is also used that the Gateway nodes are act as an intermediate node to transfer the data to the Base station. An improved description of LEACH- Mobile protocol called EECHS-MWSN which aims to reduce energy consumption in Mobile wireless sensor network and extend the lifetime of the network. In [3] paper introduces the energy renewable property and further proposes a novel 2-hop geographic node-disjoint multi-path routing algorithm TPGFPlus in energy consumption balanced duty-cycled WSNs. Analysis and simulation results show that TPGFPlus out-performs previous algorithm TPGF on finding more average number of paths and shorter average length of paths, yet without causing additional energy consumption. In [5]author have explored geographic routing in duty cycled mobile WSNs and proposed two geographic-distance based connected-k neighborhood (GCKN) sleep scheduling algorithms. The first geographic-distance based connected-k neighborhood for first path (GCKNF) sleep scheduling algorithm minimizes the length of first transmission path explored by geographic routing in duty-cycled mobile WSNs. The second geographic-distance based connected- k neighborhood for all paths (GCKNA) sleep scheduling algorithm reduces the length of all paths searched by geo-graphic routing in duty-cycled mobile WSNs. In [6] In surveillance system, while tracking the object, nodes operate in a duty cycling mode causing negatively impact on energy efficiency of node. Hence the author proposed a Probability-based Prediction and Sleep Scheduling protocol(PPSS) to improve energy efficiency of proactive wake up. The implemented system improves energy efficiency by 25-45 percent (simulation based) and 16.9 percent (implementation based) when comparing with existing algorithm. In[7] Focusing on achieving better geographic routing performance of the two-phase geographic greedy forwarding (TPGF) in duty-cycled wireless sensor networks (WSNs) when there is a mobile sink, this paper proposes a geographic distance based connected-k neighborhood (GCKN) algorithm. this paper is the first work considering and analyzing implementing geographic routing into duty-cycled mobile sink WSNs which can be taken to utilize both advantage of duty-cycling and mobility. In[8]author discuss and analyze the first transmission path's performance of the two-phase geographic forwarding (TPGF) in a CKN based WSN and further propose a geographic routing oriented sleep scheduling (GSS) algorithm to shorten the first transmission path of TPGF in duty-cycled WSNs. Author identify the first transmission path's performance of the two-phase geographic greedy forwarding (TPGF) in a CKN based WSN and propose another sleep scheduling algorithm named geographic routing oriented sleep scheduling (GSS) to decrease the length of the first transmission path searched by TPGF in duty-cycled WSNs.

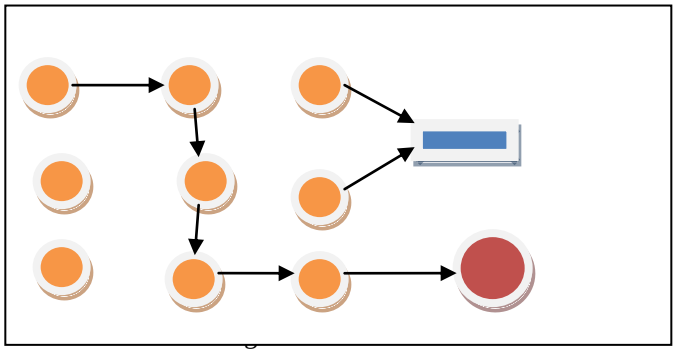
In proposed system, static routing protocol is used rather than dynamic routing because the dynamic protocol used in the network which contains mobile hosts since this mobility leads to frequently change in network topology; therefore the routing protocol needs to modify its routing protocol continuously like (OLSR and DSDV protocols).

III. RESEARCH METHODOLOGY TO BE EMPLYOED

1.Implement a sensor network by deploying verious sensor nodes in different location to sense the data of surrounding environment .This sensor node sense the data & sends to its nearest node by finding the shortest distance & finally to the base station.

2.We are implementing the protocol in which we divide the number of nodes into odd & even rows.The nodes of odd row transmit the data at time t1,At this time,routing nodes will be in sleep mode & nodes of even row acts as a routing at time t2,At this time, nodes of odd row will be in sleep mode .That means data will routes in alternate fashion.The aim is to reduce the power consumption ,so that the efficiency can be improved.

3.NS-2 simulator is used to simulate the protocol.The test result should prove that the data is transferred from node to the destination within less computation tion time as compared to existing routing protocol.



- Sensor node

- Base station

- Car

Fig 3.1 shows the wireless sensor network in which the sensor nodes are placed at different distances.In the proposed research,each sensor node sends the data to its nearest node.The same is repeated until the data is reached at base station.Since we are using forest as a monitoring area car is using for data logging.If any emergency or event occurs then node will send the data to next node by finding the shortest path.At that time only the nodes will be in active mode,so the power consumption is reduced.

In this paper, the first module of project is explained which provide node to node communication & node to base station communication based on simulation.

Module 1

The first module consist of communication model.Node labeled as 0,1,2,3,4,5,6,7,8,….are sensor nodes placed at fixed location. These nodes are collecting & transmitting the information. Node lebeled as 9 is base station in which all the information are stored transmitted by sensor nodes. Node labeled as 10 is car which is used for data logging.The results are shown in fig 3.2 by using NS-2 simulator.

Fig 3.2: Simulation of module 1

IV. CONCLUSION & FUTURE WORK

Nodes are created successfully which communicating with each other as well as with base station & car.In the next module, we will work on time frame of transmitted packet.Also we are developing a routing protocol which reduces the power consumption & increasing the efficiency of WSN.

V. ACKNOWLEDGEMENT

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