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EXPANSION OF WIRELESS SENSOR NETWORK LIFETIME BY PRODUCTIVE CLUSTERING ALGORITHM

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Abstract- *Wireless Sensor Networks (WSN) are networks of usually small, battery-powered, having with on-board processing, communication, and sensing capabilities. Owing to the limited and non-rechargeable energy supply (e.g. battery), WSNs have stringent requirements about power consumption. So energy-efficient protocols are necessary to save energy and prolong network lifetime. Particularly wireless sensor network faces issue of excessive packet loss, over hearing, retransmission of the packets because of node mobility and constant energy dissipation. From twenty years, clustering-based protocols are known to be the best for heterogeneous wireless sensor networks (WSNs) because they work on the principle of divide and conquer. In new system we are going to implement new clustering-based protocols for heterogeneous WSNs, known as single-hop energy-efficient clustering protocol and multi-hop energy-efficient clustering protocol). In new system the Cluster Head is elected by a weighted probability based on the ratio between residual energy of each node, average energy of the network and distance of the node from base station. Nodes having high initial energy and residual energy will have more chances to be elected as CHs than nodes with low energy whereas in M-EECP, the elected CHs communicate the data packets to the base station with the help of multi-hop communication approach.*

Keywords: *Paper format, publish, template, sample*

I. INTRODUCTION

A Wireless Sensor Networks (WSNs) form a subset of Ad-hoc networks as shown in fig.1.1. Wireless sensor networks have many restrictions compared to Ad-hoc networks in terms of its sensor node capability of memory storage, processing and the available energy source. Wireless sensor networks are generally assumed to be energy restrained because sensor nodes operate with small capacity DC source or battery or it may be placed where it is not always possible to replace the sensor node. Sensor network has more nodes compared to ad-hoc networks. Thus sensor network require different and more scalable solutions. In comparison to ad-hoc networks, sensor nodes have very limited power supply and recharging of sensor nodes is impractical are large number of sensor nodes. A Wireless Sensor Network has distributed autonomous sensor nodes to monitor physical or environmental conditions. The nodes communicate wirelessly. WSNs may consists of hundreds or even thousands nodes, which is further divided in different cluster and within the cluster a cluster head is elected to communicate to Base Station. A base station links a sensor network to another sensor network. It contains of a radio board, USB interface board, processor and antenna. It is programmed with low power mesh networking software for communication with wireless sensor nodes. Deployment of base station in a wireless sensor network is very important as all the sensor nodes handover their data to base station for processing and decision making. Generally Base Station are assumed static in nature.

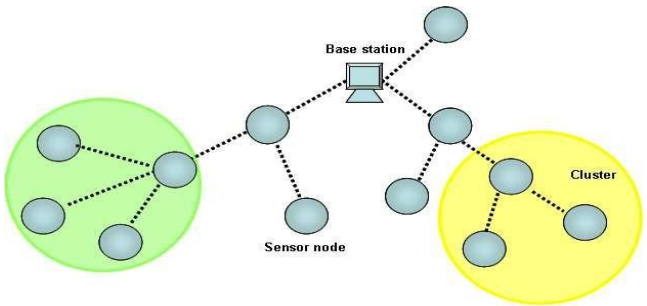

Figure 1 Typical Wireless Sensor Networks Systems

II. EXISTING TECHNIQUES

There exists two energy efficient clustering schemes for WSNs. The clustering schemes applied in homogeneous WSNs are called homogeneous clustering schemes, and the clustering schemes applied in heterogeneous WSNs are called heterogeneous clustering schemes. Low energy adaptive clustering hierarchy (LEACH) [17] is one of the first clustering schemes which plays a great role in reducing energy consumption of the nodes and enhancing the network lifetime.

LEACH gives a balance of energy consumption by using a random rotation of CHs. However, a CH expends more energy while transmitting the data to the BS, which consume high energy. LEACH performs well.

- Clustering for hierarchical routing
- Coverage efficiency
- Efficient medium access control
- Quality of service implementation
- Acceptable security

In this thesis we have restrained our study to only clustering for hierarchical routing. Hierarchical routing is also known as Cluster based routing, and is a well –known technique with special advantages related to energy efficient communication. In this we have focused on different hierarchical clustering based routing protocols.

III. PROPOSED SYSTEM

In this proposed system we are going to develop new energy efficient clustering protocol that will maximize the overall lifetime of a wireless sensor network for Heterogeneous Network. Here in this we have assumed that sensor node will communicate after the election of CHs, member nodes communicate with their respective CHs by using single-hop communication. The CHs gathers the data from the member nodes in their respective clusters, after gathering aggregate the received data and send it to the BS using multi-hop communication. Therefore simulation results show that the proposed protocols extend network lifetime and consume less energy to balance energy consumption among CHs in comparison to the existing clustering protocols. The CHs are elected based on different weighted probabilities. The weighted probability is evaluated based on the ratio between residual energy of each node and average energy of the network and the distance from the base station.

Algorithm Design procedure

- Set up Phase -Cluster head advertisement
  -Cluster head set up
  -Transmission schedule creation
- Steady State phase - Data transmission to cluster head
  -Data fusion (Data transmission to Base Station)

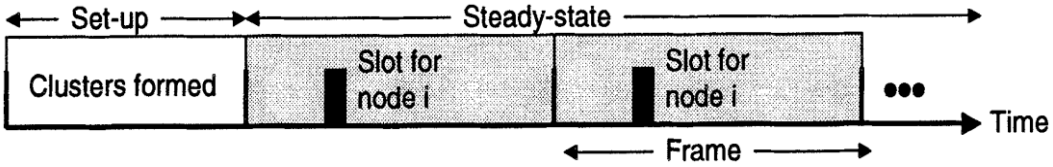

Figure 2 Time line showing LEACH operation.

The steady-state operation is broken into frames, where nodes send their data to the cluster head at most once per frame during their allocated transmission slot. The time of each slot in which a node transmits data is static, so the time to send a frame of data depends on the number of nodes in the cluster. We assume that the nodes are all time synchronized and start the set-up phase at the same time Data transmissions are explicitly scheduled to avoid collisions. Also increase the time amount of each non-cluster head node can remain in the sleep state.

IV. IMPLEMENTATION

NS2 stands for network simulator which is a discrete event simulator pointed at networking research. NS2 helps to get major support for simulation of multicast protocols, TCP and routing over wired and wireless (local and satellite) networks. Ns is an object oriented simulator, written in C++, with an OTcl interpreter as a frontend. The simulator supports a class hierarchy in C++ also called the compiled hierarchy, and a similar class bytes, packet headers, and implement algorithms that run over large data sets. For these tasks turn-around time is less important as compared to run-time speed. Oppositely, a major part of network research involves slightly varying parameters or configurations, or quickly exploring a number of scenarios. In these situations, iteration time is more important. Because of configuration runs once, run-time of this part of the task is less important. NS2 meets both these needs with two languages, C++ and OTcl. C++ can run fast but slower to change, making it suitable for detailed protocol implementation. On other hand OTcl runs much slower but can be changed very quickly, making it ideal for simulation configuration. NS2 is an open-source event-driven simulator designed for research in computer communication networks. Since its inception, NS2 has continuously gained tremendous interest from industry, academia, and government. After continuous work and enhancement, NS2 now contains modules for numerous network components such as application, routing, transport layer protocol etc.

Researchers can simply use an easy-to-use scripting language to design a network and check network performance also can observe results generated by NS2. NS2 is one of the most widely used network simulators and become the most widely used open source network simulator. The process of creating a simulation can be divided into several steps:

- Defining Topology: To ease the creation of basic facilities and define their interrelationships, ns-3 has a system of containers and helpers that facilitates this process.
- Usage of Model: Models are added to simulation (for example, UDP, IPv4, point-to-point devices and links, applications); most of the time this is done using helpers.
- Link and Node configuration: Models set their default values (for example, the size of packets sent by an application or MTU of a point-to-point link); most of the time this is done using the attribute system.
- Run or Execution: Simulation facilities generate events, data requested by the user is logged.
- Analysing the Performance: After the simulation is finished and data is available as a time-stamped event trace. This data can then be statistically analyzed with tools like R to draw conclusions.
- Graphical Visualization: Raw or processed data collected in a simulation can be graphed using tools like Gnuplot, matplotlib or Xgraph.

V. RESULT ANALYSIS

In our proposed protocol NS-2 tool is used to evaluate the performance of our WSN network. Different performance parameters are evaluated based on our simulation setup. The performance parameters used are Number of Packet send, Number of Packet received, Packet delivery ratio, Control overhead, Normalizes routing overhead, Delay Throughput, Jitter, Number of Packet dropped. Therefore in the proposed system a new Energy Efficient Clustering Protocol is proposed for Heterogeneous wireless sensor network, that have utilized single hop communication within cluster and multi hop communication for base station. For Cluster head formation it has considered the residual energy of the sensor node as well as the distance from the base station to achieve the maximum lifetime for heterogeneous WSN via simulation results. In the simulation our proposed protocols have

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