ISSN: 2350-0328

International Journal of AdvancedResearch in Science, Engineering and Technology

Vol. 6, Special Issue 1, March 2019

"National Conference On Convergent Communication Technologies And Telemedicine Networking
(NC²CT²N–2019)"
27th March 2019

Organized by

Department of ECE & BME,Vinayaka Missions Kirupananda Variyar Engineering College, India

H-Leach Based Cluster Head Selection Algorithm for Effective Data Transmission Scheme in Underwater Acoustic Sensor Networks

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ABSTRACT: As an extension of wireless sensor network in underwater environment, underwater acoustic sensor networks play a major role in academics. In UASNs the reliable and efficient data transmission very complicated in the underwater environment. It has wide variety of application like detecting underwater environment and monitoring the submarine and oil pipelines. For making efficient and secure data transmission in underwater using wireless sensor network, we therefore introduce an effective data transmission scheme called H-LEACH algorithm in UASN. It is taking the complex properties into consideration. In order to make energy efficient and extended networks lifetime, H-LEACH shapes an energy consumption model by taking residual energy and location of sensor nodes into its consideration for choosing the cluster head node.

KEYWORDS: - algorithm, Data transmission, Sensor, Networks

I. INTRODUCTION

Acoustic communications is defined as communication methods from one point to another by using acoustic signals. Acoustic signal is the only physical feasible tool that works in underwater environment. Compared with it electromagnetic wave can only travel in water with short distance due to the high attenuation and absorption effect in underwater environment. It is found that the absorption of electromagnetic energy in sea water is about 45× f dB per kilometer, where f is frequency in Hertz. In contrast, the absorption of acoustic signal over most frequencies of interest is about three orders of magnitude lower. There are some investigations about utilizing optical signal for underwater applications. However, they find out that optical signal can only pass through limited range in very clean water environment (deep water, for example). Thus, it is not a proper tool for long-distance transmission underwater, or in a not-so clean water, e.g., shallow water, environment. Underwater Acoustic Networks, including but not limited to, Underwater Acoustic Sensor Networks (UASNs) and Autonomous Underwater Vehicle Networks (AUVNs), are defined as networks composed of more than two nodes, using acoustic signals to communicate, for the purpose of

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underwater applications. UASNs and AUVNs are two important kinds of UANs. The former is composed of many sensor nodes, mostly fora monitoring purpose. The nodes are usually without or with limited capacity to move. The latter is composed of autonomous or unmanned vehicles with high mobility, deployed for applications that need mobility, e.g., exploration. An UAN can be an UASN, or an AUVN, or a combination of both.

II. LITERATURE SURVEY

A.LEACH PROTOCOL [LOW ENERGY ADAPTIVE CLUSTERING HIERARCHY]:

LEACH protocol organizes the nodes by themselves. Regular nodes in cluster send data to Cluster Head (CH). Cluster Head aggregates the data and sends to base Station. In LEACH [7] Cluster Head Selection is based on the desired percentage of CHs for the network and number of times the node has been a CH so far. Each node should select a random number between the interval 0 &1. If the generated random number is less than threshold then the node becomes a CH for current round. Threshold is obtained by using the following formula: T(n) = { P/1-P*(r mod 1/P) , if n ε G Where, P is the desired percentage of clusters; r denotes the current round; G denotes set of nodes that have not been CHs in the last 1/P rounds. Cluster Head Selection, Cluster Formation and Data Communication are taken place at a time instant is known as rounds. Each round has two phases: Set-up Phase & Steady State Phase. During Set-up Phase Cluster Head announces its election by sending advertisement message to all other nodes in order to form the cluster. During Steady State Phase each CH creates TDMA schedule for their members to transmit their data and it also tells when it to transmit. Nodes can send data during their allocated period. Radio of regular nodes is turned off until their scheduled time reached. Thus the energy is saved. Finally CH aggregates all data and sends to Base Station. Problems in Leach are i) CH selection is random and it does not consider about energy consumption of nodes. Therefore there may be a chance for CH will die earlier than other nodes. When CH dies, the cluster will become useless. ii) It cannot cover large area and CHs are not uniformly distributed. iii) It cannot be able to address the schedulability and predictability measures.

III. PROPOSED METHODOLOGY

A.SIMULATIONS

Most of the commercial simulators are GUI driven, while some network simulators require input scripts or commands (network parameters). The network parameters describe the state of the network(node placement, existing links) and the events (data transmission, link failures, etc).An important output of simulations are the trace files.Tracefiles can document every event that occurred in the simulation and are used for analysis. Certain simulators have added functionality of capturing this type of data directly from a functioning production environment, at various times of the day, week, or month, in order to reflect average, worst-case, and best-case conditions. Network simulators can also provide others tools to facilitate visual analysis of trends and potential trouble spots.

B.SIMULATION TECHNIQUES

Most network simulators use discrete event simulation, in which a list of pending "events" is stored, and those events are processed in order, with some events triggering future events—such as the event of the arrival of a packet at one node triggering the event of the arrival of that packet at a downstream node. Some network simulation problems, notably those relying on queuing theory, are well suited to Markov chain simulation in which no list of future events is maintained and the simulation consists of transiting between different system "states" in a memory less fashion . Markov chain simulation is typically faster but less accurate and flexible then detailed discrete event simulation. Some

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simulations are cyclic based simulations and these are faster as compared to event based simulations. Simulation of networks can be a difficult task.

C.NS (SIMULATOR)

Ns or the Network simulator (also popularly called ns-2) is a discrete event network simulator. It is popular in academia for its extensibility (due to its open source model) and plentiful online documentation. Ns is popularly used in the simulation of routing and multicast protocols, among others, and is heavily used in ad-hoc networking research. Ns supports an array of popular network protocols, offering simulation results for wired and wireless networks alike. It can be also used as limited –functionality network emulator. Ns is licensed for use under version 2 of the GNU General Public License.

D. TOOL COMMAND LANGUAGE:

(TCL) is an interpreted script language developed by Dr.John Ouster out at the University of California, Berkley, and now developed and maintained by Scrip tics. Tcl is comparable to: Netscape JavaScript Microsoft's Visual Basic .The UNIX-derived Practical Extraction and Reporting Language IBM's Restructured Extended Executor In general, script languages are easier and faster to code in than the more structured, complied languages such as C and C++. Script languages are sometimes considered good "glue "languages for tying several compiled programs together.Or,as stand-alone programs, they can allow you to create simple but powerful effects on their own. Tcl Blend is a version of Tcl that can access certain Java languages facilities. Tcl has a companion program, Tool kit (Tk), to help create a Graphical User Interface with TCL. OTCL is an object oriented extension of Tcl and created by David Wetherall. It is used in network simulator (NS-2) and usually run under Unix environment

E.GEDIT

GEDIT is a UTF-8 compatible text editor for the GNOME computer desktop environment. Designed as a general purpose text editor, edit emphasizes simplicity and ease of use. It includes tools for editing source code and structured text such as markup languages. It is designed to have a clean, simple graphical user interface according to the philosophy of the GNOME project, and it is the default text editor for GNOME.

Gedit includes syntax highlighting for various program code and text markup formats. Gedit also has GUI tabs for editing multiple files. Tabs can be moved between various windows by the user. It can edit remote files using GVFS (Gnome VFS is now deprecated) libraries. It supports a full undo and redoes system as well as search and replace. Other typical code oriented features include line numbering, bracket matching, text wrapping, current line highlighting, automatic indentation and automatic file backup. Some advanced features of gedit include Multilanguage spellchecking and a flexible plug in system allowing to dynamically adding new features.

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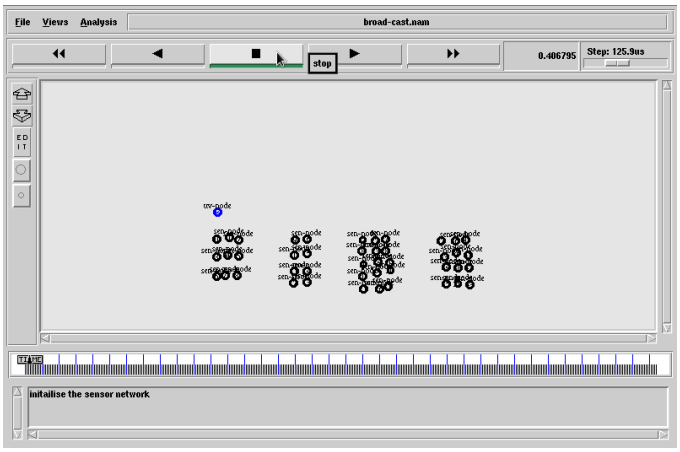

Fig 5.1 Output: Initialize the sensor nodes

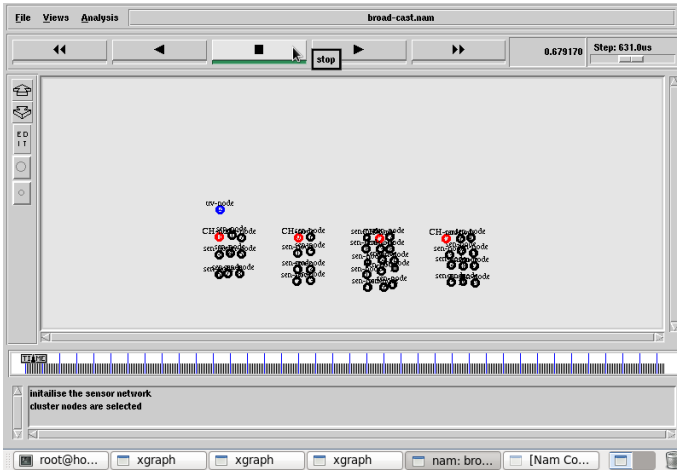

Fig 5.2 Output: Cluster nodes are selected.

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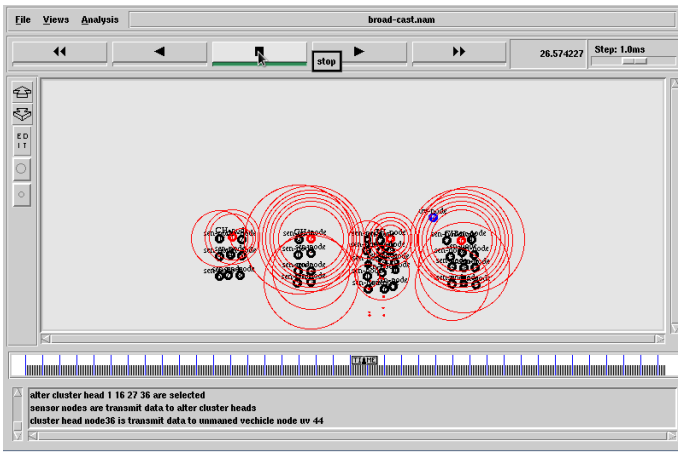

Fig 5.3 Output: Sensor nodes are transmitted data to after change the cluster head.

IV.CONCLUSION

In this project, results indicate that proposed H-LEACH is more efficient than existing one underwater communication. In the HLEACH, the average energy and residual energy of the nodes play a vital role in the selection of cluster heads. H-LEACH, being the combination of HEED and LEACH over comes the node energy issues, which is the major disadvantage of the existing one. A new formula is proposed in this paper to find the threshold value by using the average energy of the node. The energy consumed by the node for transmitting and receiving data is reduced in every round to keep track of the alive nodes in every round. Node is declared dead when its energy falls below the minimum energy required to transmit energy. LEACH being homogenous protocol achieves maximum lifetime in the proposed approach.

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