A Review Paper: Optimization in Underwater Sensor Networks

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Abstract— A wireless network is having the limitation in terms of its energy constraint. With each communication over the network some energy loss is done. Because of this the improper placement or algorithmic approach can reduce the network life. In case of underwater sensor network the problem is more critical as the GPS is not present and the nodes are floating. The presented work is about the localization of the nodes in underwater sensor network with specific parameters as well as the improved clustering mechanism is introduced with two cluster heads. In the existing work the localization and clustering are done separately.

Key words: GPS, UWSN, Clustering Architecture, Literature Survey

I. INTRODUCTION

A wireless network is having the limitation in terms of its energy constraint. With each communication over the network some energy loss is done. Because of this the improper placement or algorithmic approach can reduce the network life. In case of underwater sensor network the problem is more critical as the GPS is not present and the nodes are floating. The presented work is about the localization of the nodes in underwater sensor network with specific parameters as well as the improved clustering mechanism is introduced with two cluster heads. In the existing work the localization and clustering are done separately. In the base paper the work is defined on the localization over the floating based on the analysis of connected components. But in this work we did the parametric localization and the related clustering in same phase. It means while deciding the cluster heads the same localization parameters will be considered such as connected components, energy etc. The work also extended in terms of two cluster head definition. As one cluster head will die, it will be replaced by the second cluster head and the search will be performed for second cluster head. The presented work will perform the effective clustering and localization and improve the network life. The analysis will be done using graphs. In this review paper section 2 is about the terminology related to UWSN, section 3 is clustering architecture, section 4 is about the literature review, section 5 contains the conclusion and section 6 is the reference section.

II. TERMS ASSOCIATED TO WIRELESS SENSOR NETWORK

A. Sensor Network:

Sensor networks are one of major wide spread networks that are effective in recent years because of the involvement of the network in terms of electronics, communication and information technology in the single network. A sensor network is composed with vast number of tiny sensors. Each sensor node is defined with specific parameters in terms of energy. With each communication over the network some energy is consumed. The type of energy in the network can be of different types such as solar, electronic energy etc. This kind of network requires the effectiveness of each kind of operation in terms of energy. More the energy will be wasted, lesser the network life will be. A network is the network of connected sensors defined in terms of radio frequency, range specification etc. Each device available these days having some sensor incorporated in it such as laptops, mobiles etc. Because of this it is the challenging advance area that requires feasibility in terms of memory, power consumption, memory management, security etc. The economic and the technological factors are also required to be analyzed.

B. Hardware Specification:

The equipment used in acoustic undersea networks is understandably much different than those used by terrestrial networks. First of all, undersea sensor nodes are much more expensive than a typical sensor node. They are generally much larger and more difficult to build, as

they have to be able to handle a whole slew of new conditions, such as being in a liquid environment and also being susceptible to natural occurrences such as corrosion and fouling.

C. Node Specifications:

This kind of network basically having two types of nodes called sensor node and the master node.

D. Sensor Nodes:

These are the basic information node that transfer the information over the network in the form of signals. These work as the transmitters and defined with some energy constrains. These nodes transfer data to the master nodes.

E. Master Nodes:

Also node as head node or the collectors that work as the controller node. These nodes work as the gateway that collect data from the nodes and connect the sensor network with outer environment such as with internet etc. These nodes are capable to issue some command to sensor nodesThe sensor nodes are connected to the master node in a hierarchical manner. The number of hops that is required for a sensor node to communicate with the master node determines the level of the node.

The available frequency band is divided into sub-bands and each sub-band is assigned to a *cluster* of nodes. A cluster of nodes is deployed in the same general geographical region. The neighboring clusters are assigned different frequency bands to assure low interference. Each cluster communicates with the master node through its first level node.

III. CLUSTERING ARCHITECTURE

The basic objective on any routing protocol is to make the network useful and efficient. A cluster based routing protocol group's sensor nodes where each group of nodes

has a CH or a gateway. Sensed data is sent to the CH rather than send it to the BS; CH performs some aggregation function on data it receives then sends it to the BS where these data is needed.
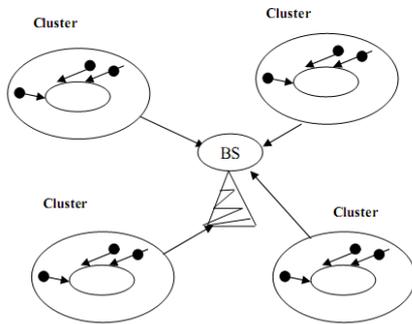

Fig. 1: Clustered Architecture[15]

A number of routing protocols have been proposed for WSN. However, few of them are cluster based. One of the most well-known hierarchical protocols is LEACH. This show significant reduction in the overall network energy over other non-clustering protocol. Hierarchical routing protocols designed to reduce energy consumption by localizing communication within the cluster and aggregate data to reduce transmissions to the BS.

IV. LITERATURE SURVEY

Slim Rekhis (2012) suggested a work to analyze the quality of the underwater sensor network some monitoring mechanism is required. Such monitoring system. In this work a water quality monitoring system is combined win sensor network based on Radio Frequency Identification System. The presented approach will reduce the network cost and the energy constraint and will provide improvement in terms of scalability, fault tolerance and reduction of error etc.[11]. Salvador Climent(2011) discussed the work on different routing and scheduling techniques for the underwater routing protocol. The channel charters tics and the nodes deployment is discussed in this paper along with the relative challenges. Besides this the main work is about the scheduling of the request under the fixed physical resources such as the channel bandwidth, radio frequency etc. The work is about to get the better utilization of physical strength of the channel. The range propagation, TDMA, CDMA approaches are discussed in this work. The network delay, throughput analysis are the basic parameters respective to which results and the effectiveness of the techniques is discussed [9]. Umberto M. Cella(2011) presented a case study of the sensor network under coastal marine environment. The paper investigates the experimental results under different scenarios. The papers discuss different aspects that affect the physical parameters of the network such as the temperature, illuminate of data etc. The work is here studied under the real environment and along with realistic problems that any underwater sensor network can face. The deployment analysis, stress factor and the environmental parameters are the important things that are discussed in this paper[12]. Salvador Climent(2011) defined a work for the scheduling and retransmission process for routing protocol in underwater sensor network. The work includes the node deployment with physical layer

specification in terms of bandwidth and the power specification of the nodes. While performing the transmission the TDMA is considered with big time-guards. The analysis also performed under CSMA based approach. The work also performed the analysis of differentscheduling and retransmission techniques for under water sensor network [10].

Michael Zuba(2011) presented work on security in under water sensor network. Security is one of the major issues for under water sensor network. One of the major security problems is network jamming that gives the denial of service over the network. A work on this problem. The work includes the study of existing DOS and jamming approaches and based on it a hardware based jammer is proposed is to analyze the network. The analysis is done over OFDM network and the work is to resolve the attack with energy efficient approach [7]. Kenneth P. Hunt(2010) performed a work on the antenna based working on mussel based under water sensor network for the rivers. In this work the biological sensors are being discussed along with environmental factors. In this work some gape sensors are discussed along with relative microcontroller and the hardware. In this work the challenges are discussed for the water proofing of physical devices such as sensors antennas etc. The work has defined in the form of a new antenna called diploe folded antenna. The physical characteristics of the devices and relatively the antenna are analyzed under different power factors and the different distance parameters [5]. Muhammad Ayaz(2009) performed a work on Underwater Wireless Sensor Networks: respective to different routing challenges and the issues. Here the different aspects are discussed that can affect the communication parameters, network delay, data rate etc. To get these changes the analysis is performed in terms of propagation delay, topological analysis, bandwidth analysis etc. The paper also explores different routing algorithms along with its comparative analysis under different scenarios and the environments. The presented work includes the relative routing algorithms along with the future work that is possible in each direction [8]. Antonio Caruso(2008) presented the analysis on the mobility model for the underwater sensor network. Here the physical movement of the nodes are analyzed respective to the connectivity, range localization, coverage area etc. The work includes study this network under real scenario and the environment. The protocol based implementation and the analysis is discussed in this chapter and relative to the coverage and the connective of the nodes [1]. The localization problem is also discussed in this paper

L. Badia(2006) performed a work on the optimization of the routing and scheduling mechanism respective the scheduling and the deployment of the nodes. The paper also discussed the intelligent scheduling scheme called integer linear programming. The optimization is been discussed along with link scheduling and the node placement in different scenarios [6].

Ian F. Akyildiz(2005) performed a work on the challenges of Underwater. It is a kind of survey work. The paper has discussed different physical architectures under the functional aspects. In this work the analytical research is performed for two and three dimensional underwater sensor networks. More over to it the detail study is performed

regarding the cross layered approach in under water sensor network. The paper also suggested some relative solution for the problem domain [2].

JiejunKong(2005) defined a work relative to the problem of localization and synchronization in underwater sensor network. The paper discuss the main characteristics of underwater sensor network such as floating mobility, signaling, link capability etc. The paper finds the physical analysis regarding the node placement or the localization respective to propagation delay, GPS signaling etc. The paper also discusses various kind of attacks that can affect such kind of network. The integration of these all performance parameters and attacks are investigated along with the architectural design [3].

JiejunKong(2005) performed presented a work in 2005 on different kind of attacks respective to the different communication parameters such as packet delivery, time synchronization and the attack over the network. Security is the major concern in this paper. Different kind of security attacks and their impact is discussed in this paper. The integrity and the security constraint of delivery services and the localization isdiscussed [4].

Zhong Zhou under large network with vast number of nodes. Here all the environmental challenges are discussed. To over all the nodes and the scenario a segmented approach is discussed that is again connected in the form of hieratical architecture. In this work the challenges respective to the problem domain are discussed along with localization parameters. The parameters discussed are the coverage area along with mobility factor. Some other techniques are suggested along with large scale modeling [14].

V. CONCLUSION

We have discussed some problem associated in the underwater sensor networks and considered as the research objectives. During the research process, the start will be performed by performing the study on existing work on sensor network with relative architectures and the scenario. The parameters relative to the work are also analyzed. The main objective of the work is to design the algorithm to identify the cluster head over the network in effective way and to define the decision vector for cluster head replacement.

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