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Novel Approach using Robust Routing Protocol in Underwater Acoustic Wireless Sensor Network with Network Simulator 2: A Review

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***Abstract* –** In recent year wireless sensor network has been an emerging technology and promising technology in unveiling the riddle of the marine life and other underwater applications. As it is a permutation of computation, sensing and communication. In the 70% of the earth a huge amount of unexploited resources lies covered by oceans. To coordinate interact and share information among themselves to carry out sensing and monitoring function underwater sensor network consists number of various sensors and autonomous underwater vehicles deployed underwater. The two most fundamental problems in underwater sensor network are sensing coverage and network connectivity. The coverage problem reflects how well a sensor network is tracked or monitored by sensors. An underwater wireless sensor networks is the emerging field that is having the challenges in each field such as the deployment of nodes, routing, floating movement of sensors etc. This paper is concerned about the underwater acoustic wireless sensor network of routing protocol applications and UW-ASNs deployments for monitoring and control of underwater domains**.**

Index Terms – *Underwater acoustic sensor network, Wireless Sensor Network, Cross layer protocol*

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1. UWSN INTRODUCTION

Underwater wireless sensor networks deployed to perform tasks in a collaborative manner over a body of water. UW-ASNs applications allow monitoring, and assisted navigation. The Underwater wireless sensor network consist nodes and connected to the acoustic communication, Autonomous devices can self-organize. Acoustic communication has been the knowledge of choice for decades when it comes to transmitting signals underwater.

There are many applications of underwater wireless sensor network which can have very identical requirements: stable or mobile, short, or long lived. As we know in under water communication there are huge difficulties as compared to atmosphere but it's very crucial because almost each country having sea costal in which we have to look after for neighbour country for safety purpose. The bandwidth available for UW-ASNs is partial and be determined on both range and frequency. As the bandwidth is limited, the acoustic signals are subject to time-varying multipath where the result is relative to radio channels.

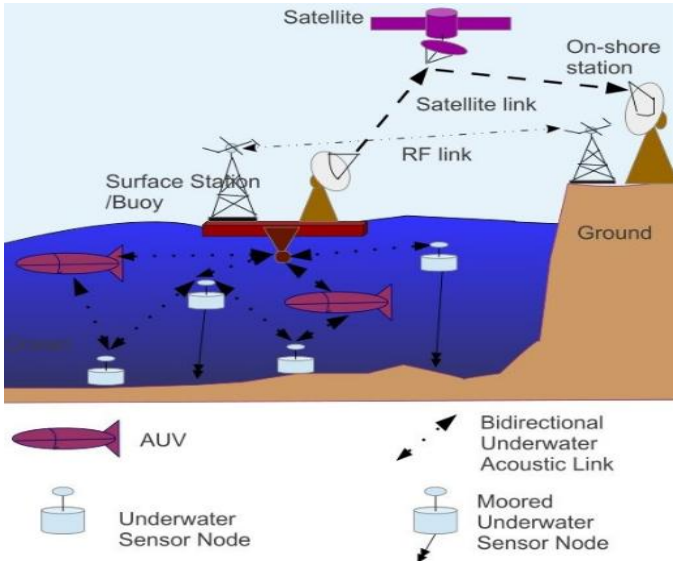

Fig1. Underwater Acoustic Wireless Sensor Networks

To increase the operation range of AUV's underwater networks can also be used. A Major challenge in the development of the underwater routing protocol is propagation delay, heavy multipath fading and varying network. For the data transmission, acoustic communication in the ocean is feasible and fig1.shows underwater acoustic sensor network [1]. No uniform distribution the network fragmentation is occurring. By the directly transmitting the sensed data to the control station of the ocean shell the one way sensed data collected. Underwater objects intersect with another, and forward sensory data to the sink nodes, which

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are typically son buoys on the water shell. In the underwater sensor networks, power consumption problems mainly occur. When deployed under the water, nodes can mainly be replaced or recharged in the harsh surroundings and ambient energy .In the acoustic communication data transmission is possible

1.1 CLUSTERING

The networks have a lot of sensor nodes attached within one single area. The battery powering is applied to all these networks for the availability of the networks at all times. The networks which are placed in an unprotected environment are not very proper in the case of security. The privacy is deployed in these types of networks due to these reasons. Also, it is not possible to charge the batteries of so many nodes in the networks. So, various techniques have been developing to provide the energy consumption of nodes in an easy manner [12]. The clustering technique has proved to be a much efficient method in saving energy. Clusters are selected amongst all the other networks due to the following factors:

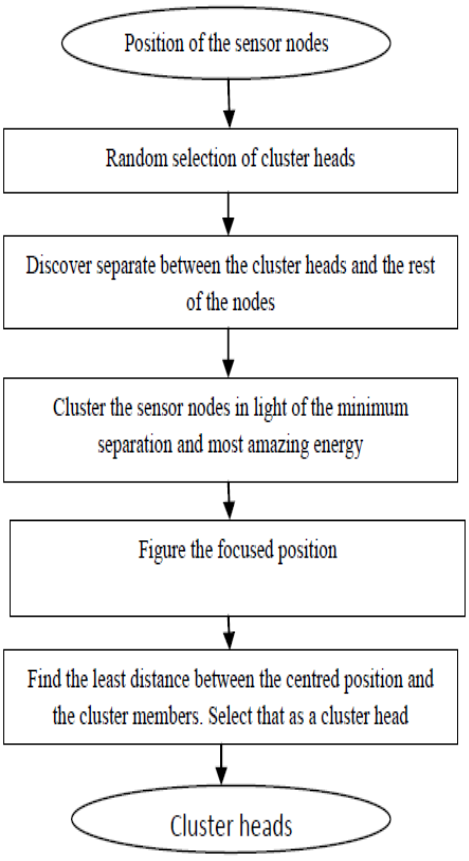

Fig.2 System Architecture for the Clustering of Nodes

- Clustering of nodes demonstrates that system is more steady and effective.
- Clustering of nodes is situated in any event separate and higher energy by important position.
- Clustering decreases activity system and increment execution.

The selection of the cluster head is a very important factor. Also, the various protocols are required for this method. The involvement of protocols and their selection are very important factors. All these affect the network system collectively in various manners. Cluster development: An elite and an extremely basic calculation that is the K implies calculation is utilized to take care of the vast majority of the clustering issue. Cluster head: Once the formation of clusters is done, re-computation of the centered of clusters is performed.

2. ARCHITECTURE OF UWSN

Securing Mobile number of sensors nodes exist in the UWSNs and uncontrolled underwater vehicles redistribute in underwater. In the underwater places of the sensor, nodes are utilized to execute helpful controlling work and examination or amassing data from the sensor nodes are utilized as a part of reallocating underwater vehicles. Different applications can be utilized as a part of UWSNs like helped route, oceanographic information gathering, and the location of contamination level, seaward movement examination, debacle avoidance, and strategic perception and anticipate regular unsettling influences in the sea. The capacity of these systems to control hunt and way underwater advancement has expanded the consideration of building the UWSN. Underwater sensor nodes and underwater vehicles must have self-plan potential [6].

Underwater sensor nodes might be migrated because of development by the fluid procedures like the shift in weather conditions and scattering. Keeping in mind the end goal to support correspondence after expulsion by streams and dissemination, the sensor nodes ought to have the proficiency to rework the system. Sensor nodes ought to have broad information of system while, taking part parameter subsequent to joining automatic design. They should have the capacity to synchronize their operation by trading different parameters with respect to arrangement, area, and development operation and to transmit checked information to some on-shore station. There are three different structures as uncovered in figure 2 for UWSNs:

Sensors nodes are attached to the bottom of the sea with nonstop sea reside. By methods for remote acoustic connections, underwater sensor nodes are interconnected to at least one underwater sinks (UW-sinks). UW-sinks are furnished with two acoustic handsets, flat and vertical handset [7]. The shell station is fit for with various acoustic

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handsets, one for each UW-sink sent. It is likewise proficient with an expanded assortment of RF or satellite transmitter to speak with the coastal sink (OS-sink) or to a surface sink (s-sink). Sensor nodes float at differing depth with a specific end goal to check a specific trial. The possible clarification to accomplish diverse depth is joined each UW-sensor node to a surface float, by methods for wires. They may likewise essentially recognize and deactivate with the enemy in the military setting.

Static Two-Dimensional Underwater Sensor Systems: For sea base observing every node attached to the sea base. An underwater sink aggregates the data from the sensor nodes by the even recipient. At that point, it transmits the data to a surface station by the vertical handset. Just before transmit with the on solid land and the surface station sinks have RF flag. Utilizing direct associations or multi-jump tracks the sensors transmitted with the sink [9-10].

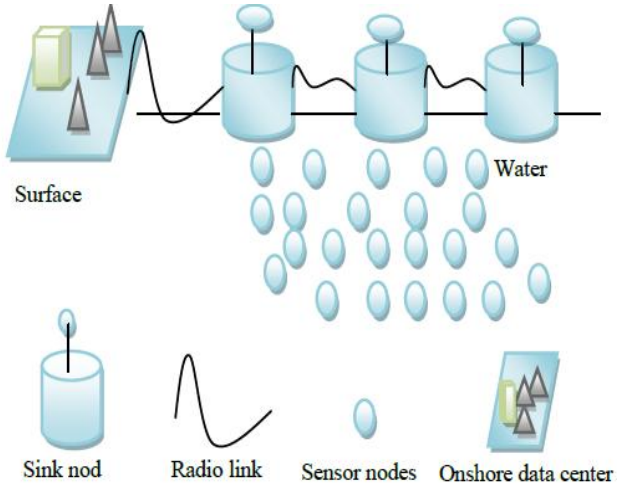

Fig3. Architecture of UWSNs

3. UWSN ROUTING PROTOCOL

3.1 SEEC:

Diverse routing protocols are proposed relevant to energy efficiency in UWSNs. Sparsity aware energy efficient clustering protocol for UWSNs is one of best protocol which is best suited for energy consumption parameter. SEEC specially scan sparse regions of the network. Entire network region divided into sub regions of same size and search sparse and dense regions of the network field with the help of sparsity search algorithm and density search algorithm. SEEC enhance network lifetime through sink mobility in sparse regions and clustering in dense regions of the network. SEEC also increase network stability with optimal number of clusters formation in dense regions of the network where each dense region logically represents a static cluster. SEEC minimizes network energy consumption with balanced scheme operations and this one is tremendous achievement. [1].

3.2 Forwarding-Function (*FF*) Based Routing Protocol:

This protocol helps in to enhance adaptive mobility of courier nodes in threshold-optimized depth-based-routing. Unlike other protocols which existed for depth-based acoustic, the iAMCTD exploits network density for time-critical applications. In order to handle various parameters for example flooding, path loss, and propagation latency, proposed protocol examine maximum holding time (*HT*) and use routing metrics: localization-free signal-to-noise ratio, signal quality index (SQI), energy cost function and depth-dependent function. Proposed protocol provides on-demand routing by formulating hard threshold (*H*th), soft threshold (*S*th), and prime energy limit (*R*prime). Simulation results verify effectiveness and efficiency of the proposed protocol [8].

3.3 Scalable energy efficient clustering hierarchy protocol (SEECH):

Scalable energy efficient clustering hierarchy protocol (SEECH) which selects CHs and relays separately and based on nodes eligibilities. In this way, high and low degree nodes are, respectively, employed as CHs and relays. In only a few past researches, CHs and relays are different, but their goal was mainly mitigation of CHs energy burden which is intrinsically satisfied by the proposed mechanism. To consider uniformity of CHs to balance clusters, SEECH uses a new distance-based algorithm. Comparisons with LEACH and TCAC protocols show obvious better performance of SEECH in term of lifetime. To evaluate the scalability of SEECH strategy, simulations are conducted in three different network size scenarios [9].

3.4 Genetic Algorithm Based Energy Efficient Clustering Hierarchy protocol (GAECH):

Clustering the WSNs is the major challenge which determines the lifetime of the network. The parameters chosen for clustering should be appropriate to form the clusters according to the need of the applications. Some of the well-known clustering techniques in WSN are designed only to reduce overall energy consumption in the network and increase the network lifetime. These algorithms achieve increased lifetime, but at the cost of overloading individual sensor nodes. Load balancing among the nodes in the network is also equally important in achieving increased lifetime. First Node Die, Half Node Die and Last Node Die are the different metrics for analyzing lifetime of the network. In this paper, a new clustering algorithm, GAECH algorithm, is proposed to increase FND, HND, and LND with a novel fitness function. The fitness function in GAECH

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forms well-balanced clusters considering the core parameters of a cluster, which again increases both the stability period and lifetime of the network.

4. TECHNOLOGIES USED IN USWN

4.1 DEADS:

Depth and Energy Aware Dominating Set technology able to enhancement of UWSNs in terms of diverse parameters for example optimization of throughput, energy conservation and BER minimization is a tremendous research area. However with scarcity bandwidth limitation there are many other factors like dynamic network topology, and high error probability and high propagation delay leads to degradation in these networks. In this regard, many cooperative communication protocols have been developed that either investigate the physical layer or the Medium Access Control (MAC) layer, however, the network layer is still unexplored. More specifically, cooperative routing has not yet been jointly considered with sink mobility. Therefore, this paper aims to enhance the network reliability and efficiency via dominating set based cooperative routing and sink mobility. The proposed work is validated via simulations which show relatively improved performance of our proposed work in terms the selected performance metrics [3]

4.2 Hybrid Technology:

In this technology TDMA, DSSS and FDMA techniques used to select CH. Due to hybrid technique different parameters enhanced fabulously. We analyze performance of famous cluster based routing protocols and identify the factors affecting energy consumption in wireless sensor networks (WSNs). From theoretical and experimental analysis, it is observed that communication distance and cluster node density are the major sources in the formation of energy and coverage holes. To overcome these deficiencies, we propose a new hybrid approach of static clustering and dynamic selection of cluster heads. We also conduct a comprehensive energy consumption analysis of our technique with selected existing ones. Simulation results show that the proposed technique is relatively better in terms of energy holes minimization and network lifetime prolongation [4].

4.3 M2M:

Localizing machine-type communication (MTC) devices or sensors is becoming important because of the increasing popularity of machine-to-machine (M2M) communication networks for location-based applications. These include such as health monitoring, rescue operations, vehicle tracking, and wildfire monitoring. Moreover, efficient localization approaches for sensor-based MTC devices reduce the localization error and energy consumption of MTC devices. Because sensors are used as an integral part of M2M communication networks and have achieved popularity in underwater applications, research is being conducted on sensor localization in both underwater and terrestrial M2M networks. Major challenges in designing underwater localization techniques are the lack of good radio signal propagation in underwater, sensor mobility management, and ensuring network coverage in 3D underwater M2M networks. Similarly, predicting the mobility pattern of MTC devices, trading-off energy consumption and location accuracy pose great design challenges for terrestrial localization techniques. This article presents a comprehensive survey on the current state-of-the-art research on both terrestrial and underwater localization approaches for sensor-based MTC devices. It also classifies localization approaches based on several factors, identifies their limitations with potential solutions, and compares them [5].

4.4 Doppler Estimation Based on Frequency Average and Remodulation:

Underwater acoustic communication channel is time varying and has Doppler Effect due to wind, sea surface roughness, and platform motion. We have to recognize the changing channel state and apply it to communication technique for increasing transmission efficiency in the underwater acoustic channel. In this paper, we propose more reliable Doppler estimation method based on frequency average and remodulation. We conducted the simulation and sea trial to evaluate the performance of the proposed method. When the channel coding technique was not applied, the uncoded bit error rate performance of the proposed method was improved about maximum 50.3% compared with conventional method [15].

5. APPLICATION OF UWSN

5.1 Ocean biology:

The health of the water bodies and of the marine life it sustains is an accurate indicator of the level of pollution in the environment. To study this, we need a power efficient, self-sustained network to sense and analysis the required parameters.

5.2 Disaster Management:

Having the seabed under surveillance would help in disaster management as we could sense various disasters having their epicentre in the ocean or sea, at an early stage. From the information gathered, pre-warning can generate for the nearby terrestrial areas.

5.3 Surveillance Systems:

The world has seen large number of border issues between countries sharing boundaries, be it on land or in waters. So

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Wireless Sensor network can be used to keep the disputed water areas under surveillance to check for any enemy intrusion.

5.4 AUV/ROV Operation:

The unmanned robots are used underwater for various data collection purposes.

6. CONCLUSION

In summary, with the importance of VANET comparative to its vast potential it has still many challenges left in order to overcome. Security of VANET is one of the important features for its deployment. In our review paper, we have analyzed the behavior and challenges of security threats in Vehicular Ad-Hoc networks with solution finding technique. In our base work black hole attack used in network communication using AODV protocol. As we know there are many issues in VANET and specially security issues. Therefore in our research work we will proposed a new protocol which has superior result as compared to base work in term of end to end delay, energy consumption, packet delivery ratio, throughput and overhead. Besides this a security algorithm also implemented so that unauthorized person cannot access the authentic data.

7. FUTURE SCOPE

With pace of time new technology came into existence and changing rate of technology is very fast. In these days machine learning or deep learning and artificial intelligence are very popular. Besides this internet of things (IoT) is one of most booming and tremendous technology these days. In today's scenario internet becoming basic requirement of every person which play very crucial role in our daily life. In near future every machine will be connected to the internet. We can adept these technology for further enhancement in networking to improve the diverse parameters.

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