

A RELIABLE AND EFFICIENT ROUTING PROTOCOL FOR UNDERWATER ACOUSTIC SENSOR NETWORKS USING OPPORTUNISTIC ROUTING ALGORITHM

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Abstract– To monitor the large area covered by water desirably, underwater acoustic networks have grown rapidly in the recent decade. However, due to the differences between terrestrial radio propagation and underwater acoustic propagation, it is crucial to design energy efficient routing protocols for underwater acoustic network. We propose a location aware opportunistic routing algorithm for under water communication.

Keywords–Underwater acoustic network, Medium access control, Intra cluster grouping mechanism, Opportunistic routing algorithm.

I. INTRODUCTION

Under water acoustic networks is a growing field. The ease of use and ability of wireless nodes to work as a standalone device has made it easier to set up network just about anywhere. There are also certain repercussions that arise when implementing these wireless networks namely, the energy consumption and data collisions. To improve the network life time opportunistic routing algorithm is implemented to effectively use the limited power supply.

The data collision problem occurs when a new node is introduced in the network. The nodes in the network exist as a cluster; each cluster will have a cluster head with sub nodes attached to it. The new

node introduced in the network will communicate with cluster head to attach itself with the network. the use of Omni directional antenna will result in use of more energy from the battery and also the data will be transferred to all the nodes in its coverage region, if a directional antenna is used along with beam scanning technique then the use of energy will be minimum and also the data transfer will be limited to particular nodes which will reduce data collision in the network.

The use of routing algorithm such as opportunistic routing algorithm improves network through put by means of overhearing transmission between nodes in its proximity. Initially the nodes are prioritized such that the low priority data forwarder will not forward the data from a high priority data forwarder node. In today's world automation is the rapidly growing under water acoustic networks are in extensive use for remote monitoring.

In areas such monitoring as traffic, medical care, in hospitable terrain, robotic exploration, and agriculture surveillance. The advent of efficient wireless communications and advancement in electronics has enabled the development of low-power, low-cost, and multifunctional wireless sensor nodes that are characterized by miniaturization and integration. In Under water acoustic networks, thousands of physically embedded sensor nodes are

distributed in possibly harsh terrain and in most applications, it is impossible to replenish energy via replacing batteries. In order to cooperatively monitor physical or environmental conditions, the main task of sensor nodes is to collect and transmit data. It is well known that transmitting data consumes much more energy than collecting data.

To improve the energy efficiency for transmitting data, most of the existing energy-efficient routing protocols attempt to find the minimum energy path between a source and a sink to achieve optimal energy consumption. However, the task of designing an energy-efficient routing protocol, in case of sensor networks, is multifold, since it involves not only finding the minimum energy path from a single sensor node to destination, but also balancing the distribution of residual energy of the whole network.

Furthermore, the unreliable wireless links and network partition may cause packet loss and multiple retransmissions in a preselected good path. Retransmitting packet over the preselected good path inevitably induces significant energy cost. Therefore, it is necessary to make an appropriate trade-off between minimum energy consumption and maximum network lifetime.

Grouping mechanisms are effective compared to the non-grouping mechanisms. Intra-cluster grouping mechanism (I-CGM) and Beam scanning intra-cluster grouping mechanism (BSI-CGM), which aim at reducing energy consumption to the best possible level. BSI-CGM is a grouping scheme where the energy during the communication process.

New node joining the UAN is greatly reduced. This allows collision free communication and also the new node joining process is efficient and achieved with lesser delay and simulation of beam scanning in under water acoustic networks and provides node joining into its suitable subgroup.

II. INFERENCE FROM LITERATURE SURVEY

Clustering is a promising approach to extending the lifetime of underwater acoustic networks. Currently research does not consider

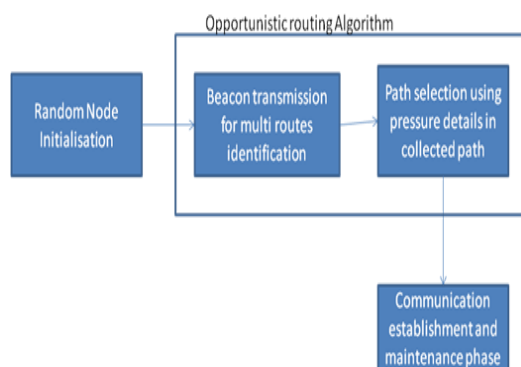
communication reliability as an objective when designing a clustering algorithm. In addition, limited studies have been undertaken in multihop intra-cluster routing. In this paper, an intra-cluster routing algorithm (RINtraR) enabling high quality multihop communication between sensors is introduced. A comparison between RINtraR adapted LEACH and the original LEACH algorithm are provided. Results show better transmission reliability compared with LEACH.

FPGA routing is one of the most time consuming steps in a typical CAD flow. The problem itself is similar to the NP-complete problem of computing a set of disjoint paths in a graph. The routing resource graph (RRG) that represents an FPGA routing network is necessarily large, and becomes even larger when modeling modern FPGAs that integrate sparse intra cluster routing.

A method for electronic beam scanning in linear arrays of antenna-coupled oscillators is introduced which eliminates the need for phase shifters. It is shown that a constant phase progression can be established by slightly detuning the peripheral array elements, while maintaining mutual synchronization.

As devices in sensor network are energy limited so energy efficiency is the most critical parts of this network. To have energy efficient network, efficient routing plays very important role. In this paper, an energy efficient modified hybrid adaptive intra cluster routing is proposed which provides best solution for the problem offered by traditional and simple adaptive routing algorithms. Quantitative analysis reveals its energy efficiency over the previously published work.

III.METHODOLOGY



IV.RANDOM NODE INITIALIZATION

Node should be initialized in source node transmission rates, throwing out less important messages, and using scheduling to avoid as many collisions as possible which only exacerbate the congestion problem. Node localization is the problem of determining the geographical location of each node in the system. Localization is one of the most fundamental and difficult problems that must be solved for UAN. Localization is a function of many parameters and requirements potentially making it very complex.

V.OPPORTUNISTIC ROUTING ALGORITHM

Opportunistic Routing (OR) adopts a new concept called energy equivalent node (EEN), which selecting relay nodes based on opportunistic routing theory, to virtually derive the optimal transmission distance for energy saving and maximizing the lifetime of whole network. Since sensor nodes are usually static, each sensor's unique information, such as the distance of the sensor node to the sink and the residual energy of each node, are crucial to determine the optimal transmission distance; thus, it is necessary to consider these factors together for opportunistic

routing decision. OR selects a forwarder set and prioritizes nodes in it, according to their virtual optimal transmission distance and residual energy level. Nodes in this forwarder set that are closer to EENs and have more residual energy than the sender can be selected as forwarder candidates.

Our scheme is targeted for relatively dense 1-D queue networks, and can improve the energy efficiency and prolong the lifetime of the network.

VI.COMMUNICATION ESTABLISHMENT AND MAINTAINANCE PHASE

The signal from the antenna sensor is received by data acquisition chamber where signal is received and sends the signal to MATLAB for further processing where different signals are generated.

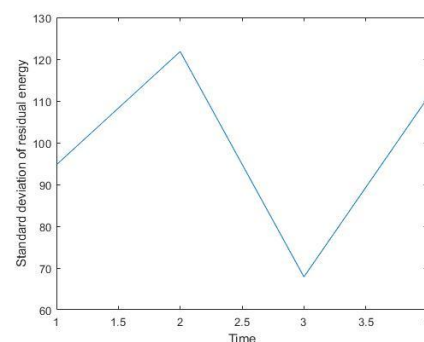
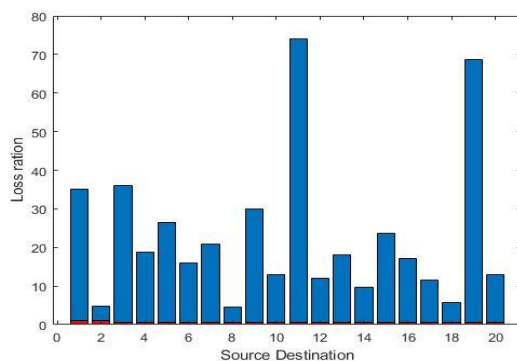
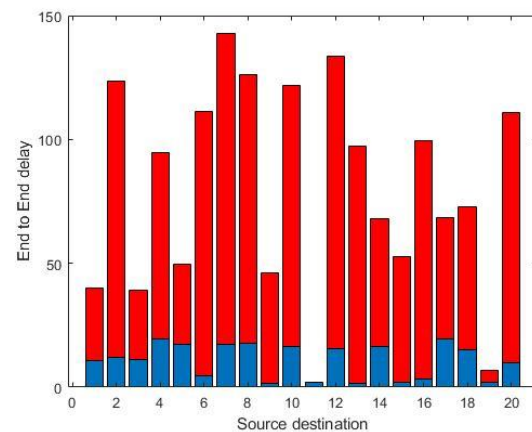
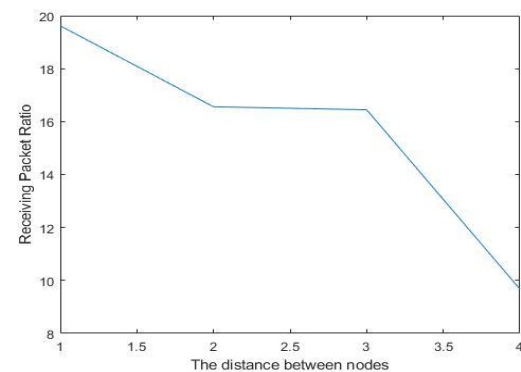
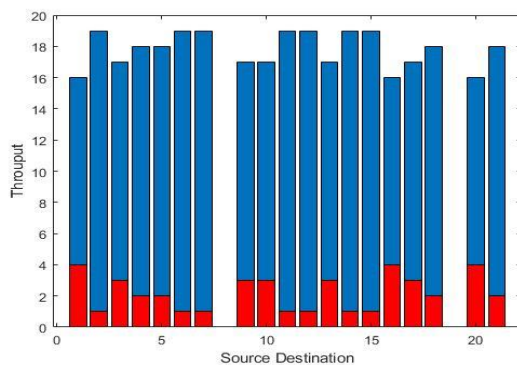
VII.MATLAB

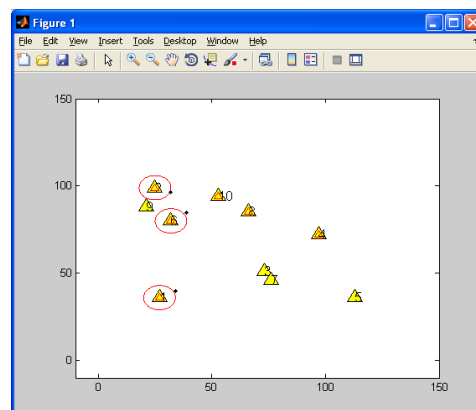
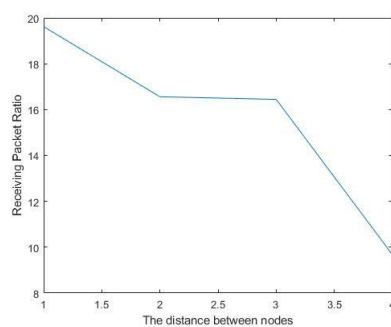
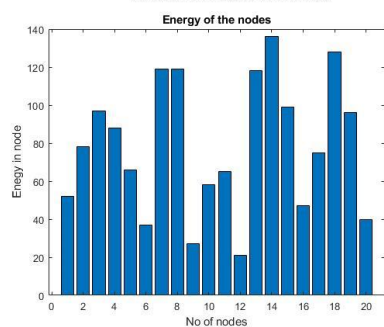
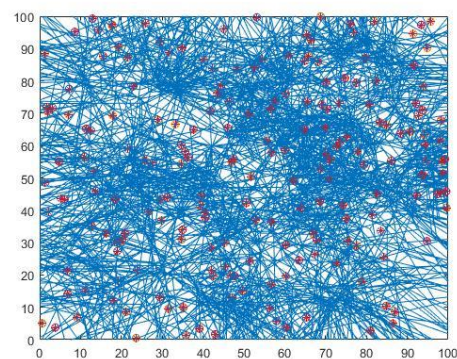
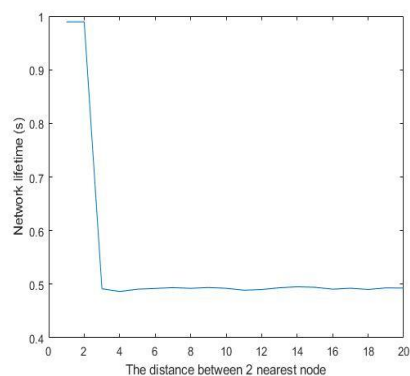
Matrix laboratory is a multi paradigm numerical computing environment and forth generation programming language. A proprietary programming language developed by math works MATLAB allows matrix manipulations, plotting of functions and data, implementation of algorithms. When creating a MATLAB function, the name of the file should match the name of the first function in the file, valid function names begin with alphabetic character and can contain letters, numbers and underscores. Here we use MATLAB for detection of tumour size and shape, due to variation of noise present in the signal.

VIII.RESULTS AND DISCUSSION

Here we make use of BSI-CGM in which a beam scanning method is used to scan the area around the new node to see if it can find a CH to be able to become a member in its groups. The area around the new node is first considered as a 360° angle with its current position at the centre of the circular area. The new node first broadcasts (360° the beacon signal to collect the information about available cluster heads and their respective weight

(based on minimum number of nodes and maximum energy). After that it creates a cluster head list. It then selects a cluster head from the cluster head list. Next it steers antenna to 60° (beam forming) and checks the location of selected cluster head by transmitting a beacon signal. If the new node finds the selected cluster head, then it starts the group joining process with the selected cluster head in cluster having minimum number of nodes or cluster having lower energy nodes. In this BSI-CGM we use an optimized algorithm called opportunistic routing algorithm. This opportunistic routing algorithm overcomes the existing disadvantages by reducing energy consumption thereby increasing the network lifetime.





IX.CONCLUSION

Applications drive the development of underwater sensing and networking. Inexpensive computing, sensing and communications have enabled terrestrial sensor networking in the past couple of decades; we expect that cheap computing, combined with lower cost advanced acoustic technology, communication and sensing, will enable underwater sensing applications as well.

While research on underwater sensor networks has significantly advanced in recent years, it is clear that a number of challenges still remain to be solved.

With the flurry of new approaches to communication, medium access, networking and applications, effective analysis, integration and testing of these ideas is paramount—the field must develop fundamental insights, as well as understand what stands up in practice. For these reasons, we believe that the development of new theoretical models (both analytical and computational) is very much needed, and that greater use of test beds and field experiments is essential; such work will support more accurate performance analysis and system characterization, which will feed into the next generation of underwater communications and sensing. In addition, integration and testing of current ideas will stress the seams that are often hidden in more focused laboratory research, such as total system cost, energy requirements and overall robustness in different conditions.

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