EFFICIENT COMMUNICATION IN UNDERWATER ACOUSTIC SENSOR NETWORKS USING RELAY NODES

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Abstract- An underwater acoustic sensor network with one mobile surface node to collect data from multiple underwater nodes. the issues of relay node placement and the flow allocation (RNP-FA) have been considered as a joint problem and is formulated into an integer nonlinear programming problem which is NP-hard in general. To solve the problem efficiently, this paper proposes a novel heuristic scheme for UASNs which works based on a 3 dimensional (3D) architecture. The proposed scheme consists of three algorithms, named as Alternative Flow and Relay-node Adjustment (AFRA) as a whole. Extensive simulation experiments demonstrate that the proposed scheme offers a simple yet attractive solution to the problem.

Keywords: *wireless sensor networks, Underwater Sensor Networks, TCP&HTTP, IP&FTP*

I.INTRODUCTION:

As an extension of wireless sensor networks WSNs in underwater environment. In underwater acoustic sensor networks UASNs have been developed for many potential applications, including offshore resource exploration, environmental monitoring and disaster prevention, etc. Prolonging the network lifetime is a crucial issue for the UASNs to deliver their full potential and to enable various fundamental applications. The objective of this work is to jointly determine the RNs placements and the flow allocation in multiple routes in order to improve network performance in terms of the lifetime of the entire network. In WSNs many researchers have proposed to deploy RNs with the function to forward sensor data toward the BS over multiple hops.

The network lifetime is directly determined by the battery supply and the power consumption of the underwater sensor nodes. However, since it is more difficult to replace the battery or to recharge the sensor nodes in underwater scenarios than its terrestrial counterpart reducing the energy consumption has become the major way to improve the network lifetime. The receiving power consumption of a node is mainly correlated with the number of data bits it receives. As a result, if the power consumption can be reduced the lifetime of the network can be prolonged. In order to achieve it, the way is to shorten the distance between nodes and reduce the information transmitted between them.

EFFICIENT COMMUNICTION IN UW-ASNs

Underwater sensor networks find applications in oceanographic data collection, pollution monitoring, offshore exploration, disaster prevention, assisted navigation, tactical surveillance, and mine reconnaissance. The enabling technology for these applications is acoustic wireless networking. The objective of this research is to explore fundamental key aspects of underwater acoustic communications, propose communication architectures for UW-ASNs and develop efficient sensor communication protocols tailored for the underwater environment. The proposed routing solutions allow each node to select its next hop, with the objective of minimizing the energy consumption taking the different application requirements into account. A resilient routing solution to guarantee survivability of the network to node and link failures in long-term monitoring missions is developed.

Two-dimensional Underwater Sensor Networks.

A two-dimensional underwater networks is group of sensor nodes are anchored to the bottom of the ocean with deep ocean anchors. By means of wireless acoustic links, underwater sensor nodes are interconnected to one or more underwater sinks which are network devices in charge of relaying data from the ocean bottom network to a surface station.

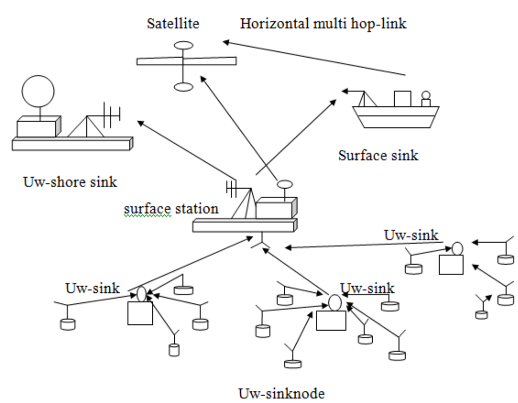

Figure 1: Underwater Sensor Network

Three-dimensional Underwater Sensor Networks.

Three dimensional underwater networks are used to detect and observe phenomena that cannot be adequately observed by means of ocean bottom sensor node to perform cooperative sampling of the 3D ocean environment. In three dimensional underwater networks sensor nodes float at different depths in order to observe a given phenomenon.

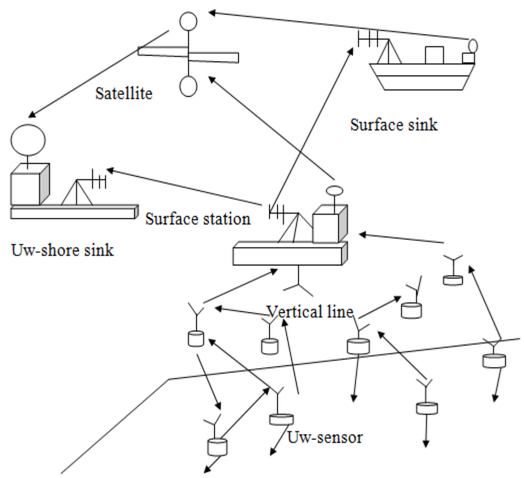

Figure 2: 3D Underwater Sensor Network

In this architecture depicted in each sensor is anchored to the ocean bottom and equipped with a floating buoy that can be inflated by a pump. The buoy pushes the sensor towards the ocean surface. The depth of the sensor can then be regulated by adjusting the length of the wire that connects the sensor to the anchor by means of an electronically controlled engine that resides on the sensor.

RELAY NODE

A relay network is a broad class of network topology commonly used in wireless networks, where the source and destination are interconnected by means of some nodes. In such network the source and destination cannot communicate to each other directly .Because the distance between the source and destination is greater than the transmission range of both of Node.

A relay network is a type of network used to send information between two devices for e.g. server and computer that are too far away to send the information to each other directly. Thus the network must send or relay the information to different devices, referred to as nodes that pass on the information to its destination. A well-known example of a relay network is the Internet. A user can view a web page from a server halfway around the world by sending and receiving the information through a series of connected nodes.

II ROUTING PROTOCOL

There are a number of characteristics of sensor networks that make the routing in them a challenging task including:

(1) The inability to apply classical IP-based protocols in sensor networks.

(2) The flow of data from multiple sensor nodes to a single sink node.

(3) Data redundancy.

(4) The resource constraint of sensor nodes.

The resource constraint means sensor nodes have limited energy limited processing and memory capability as well as limited transmission power. Many routing algorithms have been proposed in the past few years to address the challenges of routing in sensor networks. In general, these protocols can be broadly classified into three major categories, flat-based routing, hierarchical-based routing and location-based routing, based on the network structure. Flat-based routing protocols treat all nodes equally while hierarchical protocols take a cluster-based approach where some nodes are treated as cluster heads. Location-based protocols make use of location information for routings.

DIFFERENT KINDS OF PC PROTOCOL

The amount of various languages they use, the amount of various machines they use, the amount of the way within which they transmit knowledge and also the completely different code they use. We would ne'er be ready to communicate worldwide if we tend have been no 'standards' governing. This method to be communicate and also the method our machines treat knowledge

TCP&HTTP

Transmission management Protocol, used for the reliable transmission of information over network. A machine-readable text Transfer Protocol, used for sending and displaying info within the variety of websites on browser.

FTP &POP

File Transfer Protocol, used for file transfer uploading and downloading over web. The foremost common protocol for receiving mail in Post workplace Protocol POP. It currently inversion three thus it's know as POP3.Emailshoppers like Outlook categorical net associate address for a POP3 server before they will browse mail. The SMTP and POP3 servers not an identical address.

IP&FTP

Web Protocol is that the primary network protocol used on the web developed within the Nineteen Seventies. On the web and plenty of different networks science is usually used in conjunction in transfer control protocol and named interchangeable with an TCP science supports to an distinctive with addressing for computers is to provide with its own on to provide a network.

Data on an online Protocol network is organized into packets. Every science packet includes each a header and therefore the message data itself. IP functions at layer three of the OSI model

File Transfer Protocol FTP lives up to its name and provide a technique for repeating files over a network from one laptop to a different. Additional usually, it provides for an few easy file management on the contents of a distant laptop.

III PROBLEM STATEMENT

In WSNs, many researchers have proposed to deploy RNs with the function to forward sensor data toward the BS over multiple hops. In the minimum number of RNs for different application requirements in WSNs. For example, the solution is to build a path consisting of RNs between each pair of SNs. RNs with consideration of the network lifetime constraint. A fault tolerant network by developing a k-connected graph. Caro et al. has used RNs to improve network performance in terms of delivery ratio and end-to-end delay.

It proposed a smart select algorithm to select positions for RNs and BSs in given locations in order to minimize the cost of deployment. In recent works, such as, the authors have addressed issue of relay placement to minimize either total energy consumption or the total delay in the whole network. However, none of the above work has directly focused on the goal to prolong the network lifetime.

Some routing protocols have been pro-posed to alleviate the effect of energy limitations in WSNs. Most of them rely on the power-based shortest path algorithms in order to minimize the energy consumption in routing. However, the nodes in the minimum energy path to the BS could be drained out of batteries quickly while other nodes may still have a large amount of residual energy. It is the fact that the overall network is dead with lots of its components still alive. Chang et al. has tried to maximize the system lifetime of WSNs but only the flow allocation has been considered without increasing the RNs in the networks. What is more, the flow allocation algorithm proposed cannot be directly applied in a 3 dimensional 3D underwater scenarios not only because of the complex computation of 3D Euclidean distance between nodes.

RIA is executed to determine the RNs initial locations at x-y coordinates on the surface of the water. The RIA needs to determine where more RNs should be deployed according to the characteristics of a given UASN. Generally there are two kinds of situations to deploy more RNs. One is that more RNs should be deployed around the BS because nodes near the BS have to relay more traffic and their energy may deplete very quickly. So if RNs can be used to help SNs to relay traffic to the BS. The power required to transmit data can be reduced according to expression. The other is that more RNs should be deployed to the area where the lifetimes of the SNs are shorter. So it is reasonable to deploy more RNs to the surface area of the water where the SNs below have shorter lifetimes. Here the initial x-y coordinates of RNs are determined the z-coordinates could be auto-adjusted by using the RAA algorithm later. Slow propagation speed will impact the communication performance and the network to achieve good connectivity. As a result these RNs can eventually be used to enhance the overall network lifetime by our solution.

IV PROPOSAL FOR A SUGGESTED SOLUTION

An underwater acoustic sensor network with one mobile surface node to collect data from multiple underwater nodes. The mobile destination requests retransmission from each underwater node individually employing traditional automatic-repeat-request ARQ protocol. We propose practical node cooperation NC protocol to enhance the collection efficiency utilizing the fact that underwater nodes can overhear the transmission of others. To reduce the source level of underwater nodes the underwater data collection area is divided into several sub-zones and in each sub-zone the mobile surface node adopting the NC protocol could switch adaptively between selective relay cooperation SRC and dynamic network coded cooperation DNC.

The difference of SRC and DNC lies in whether or not the selected relay node combines the local data and the data overheard from un decoded node to form network coded packets in the retransmission phase. A practical node cooperation protocol for a middle-scale UWASN with one mobile surface node to collect data from multiple underwater nodes. The proposed NC protocol can improve the system performance significantly.

INITIALIZATION OF NODES

The network is a one-hop small-scale network with one central coordinator, which has only 3~5 underwater nodes. We consider a middle-scale Network. It has 14 or more underwater nodes in the next example. Therefore, the surface destination node needs to be working in a mobile collection way. The node cooperation in is adopting the SRC protocol or the DNC protocol separately. Yet in this paper, as the surface node works in a mobile way, it could switch between SRC and DNC according to underwater environment.

. The energy consumption issues are considered during the mobile cooperation design. Specifically, the data collection area division, the rules of non-cooperative index and cooperative zone design are studied for energy saving.

SEND PACKET

An underwater acoustic data collection network, we assume that there are N bottom sensor nodes which sample environmental parameters on their own schedule and transmit the data to the surface buoy periodically through acoustic links.

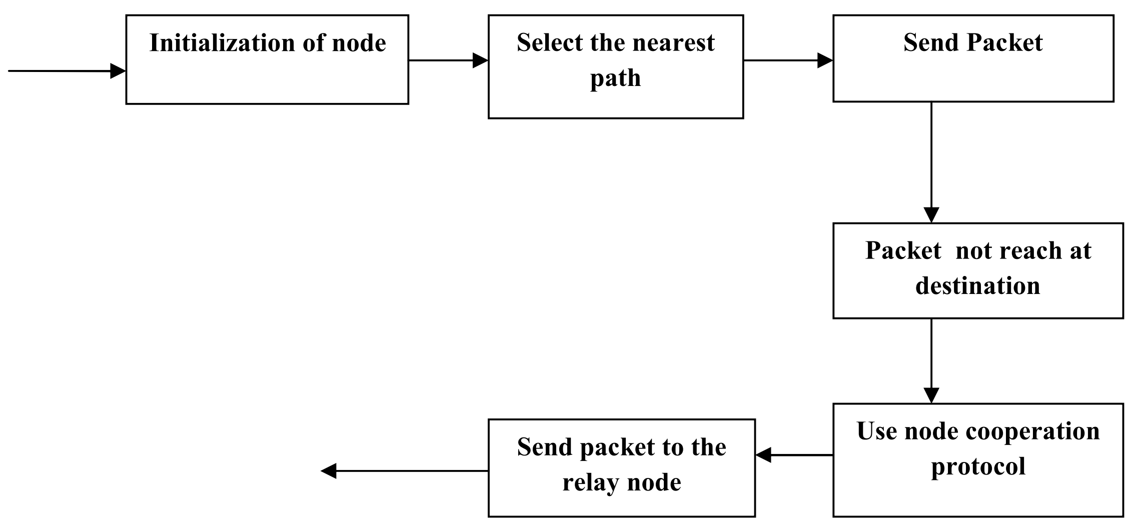

Figure 3: Architecture diagram

it should be select the nearest path. If the path selected then send the packet from each node and while sending packet will not reach the destination means here using an algorithm as node cooperation protocol then send packet to the relay node. In this use of node cooperation protocol packet sending to relay node is performed to the destination.

COOPERATION PROTOCOL

The destination will first send a request to all the underwater nodes including a collection schedule, and then all the N. To collect the data from N nodes send the data packets to the destination in turn. After decoding at the destination, the destination will request another round of transmission for those nodes with decoding failures, says Si to S. Then the corresponding nodes will send another transmission, where the retransmitted packet could be identical to the original packet as in the type-I ARQ protocol, or could be a different packet with additional parity check bits as in the type-II ARQ protocol. This procedure repeats until the destination collects the data from all the nodes successfully or a maximum round of transmissions is reached.

We have proposed selective relay cooperation SRC and dynamic network coded cooperation DNC protocols. In the selective relay cooperation protocol, instead of retransmission by the un decoded node itself, another node that has overheard the transmission successfully and has a better channel condition will be selected as a relay.

In the dynamic network coded cooperation protocol, each selected relay node transmits a network coded packet combining the overheard data from several un decoded nodes. The cooperation schedules are optimized at each transmission round by the central control node based on the collected information, especially the channel quality as reported by the physical layer.

V CONCLUSION

Cooperative nodes that provide alternative paths as intermediate nodes along a specific source-to-destination route. The proposed scheme by comparing it to a conventional S&W ARQ in terms of throughput efficiency. In this paper, an efficient cooperative protocol was proposed for multi-hop underwater acoustic channels by applying. This scheme uses cooperative nodes that provide alternative paths as intermediate nodes along specific source-to-destination route. This alternative path has higher channel quality than that of the direct source destination path. Consequently, the throughput efficiency is substantially improved. Through the computer simulation, we evaluated the proposed scheme by comparing it to a conventional S&W ARQ in terms of throughput efficiency. In addition, utilizing the overhearing as an ACK is gainful. Couple the node cooperation with power control or adaptive modulation and coding to minimize the energy consumption or prolong the network lifetime.

REFERENCES

1.E.M.Sozer, M. Stojanovic, and J. G. Proakis, “Underwater acoustic networks”.

2.J.-H. Cui, J. Kong, M.Gerla, and et al, “The challenges of building mobile underwater wireless networks for aquatic applications”.

3.M. Erol-Kantarci, H.T.Mouftah, and S.Oktug, “A survey of architectures and localization techniques for underwater acoustic sensor networks”.

4. H. Chen, G. Fan, L. Xie, and et al, “A Hybrid Path-Oriented Code Assignment CDMA-Based MAC Protocol for Underwater Acoustic Sensor Networks”.

5. W.Alsalih, H.Hassanein, and S.Akl, “Placement of multiple mobile data collectors in underwater acoustic sensor networks,” Wireless Communications and Mobile Computing.

6. P. Zheng, H. Mo, J. Liu, and et al, “A networked acoustic modem system for underwater applications”.

7. L. Wan, H. Zhou, D. Wilson, and et al, “Analysis of underwater OFDM performance during a two-month deployment in Chesapeake Bay”.

8. M.Stojanovic, and J. Preisig, “Underwater acoustic communication channels: Propagation models and statistical characterization”.

9. M. K. Park, and V.Rodoplu, “UWAN-MAC: An energy-efficient MAC protocol for underwater acoustic wireless sensor networks”.
10. M. Zorzi, P. Casari, N. Baldo, and et al, “Energy-efficient routing schemes for underwater acoustic networks”.