Vector Based Routing Through Dual Sink in Wireless Sensor Network

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Abstract— Wireless sensor network is emerging as powerful technique, there are many protocols are discovered for wireless sensor network. While process of transmitting the data consumes energy of each node so energy consumption is one of the important corner in wireless sensor network .dual sink vector based forwarding(DS-VBF) takes both remaining energy and location information as regarded factor to discover an optimized path to save energy in network. The modified routing protocol place dual sink in to the network which improves the network life time. according to the **deployment** of dual sink packet delivery ratio and end to end delay are **enhanced** .the simulation result in comparing with VBF end to end delay are reduced more than 80% ,remaing energy increased 10% increment of packet reception ratio was about 70%.

Keywords - *component; wierless sensor network (WSNs); Routing protocol;loaction based routing;energy efficiency; multisink architreture; Underwater sensor network (UWSNs).*

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I. INTRODUCTION

Wireless sensor network is promising used for many applications because of limited energy resource, memory space, and processing capacity of sensor nodes .it is very hard to implement IP-based routing protocols in wireless sensor network many research or researchers are focus on developing protocol for wireless sensor network with respect to a main design **criteria** like memory spacing, energy efficiency, load balancing etc.

Where wireless sensor network   plays very important part in human life, where there are so many geo graphical routing protocol and novel based vector protocols are there, but routing protocol for WNS is very challenging because it should be simple, energy-efficient ,scalable and very robust because it should be deal with very large number of sensor nodes[1].and also be self recognizer from when node failed, by the recent researches in WSN it has a low cost ,low power, multifunctional sensor node that are small in their size and they communicate unmetered in very short distance[2].

Routing protocol for land based sensor network are present, however these protocols are used for static and low dynamic network like in Directed Diffusion **.**routing is start by a sink node, so sink first floods its nearest for data across the whole network where a each sensor node may consist of data as of all other nodes. upon receiving the data from its nearest node it reply back to the sender node with data and path information, then the optimized path is established between sensor node to the sink node for example- in SPIN routing is initialized by sensor nodes, when node want to transmit a data first it broadcast a description of data, the neighboring decide whether to request the data based on its resource [3].

In Geographic-based routing protocols: suppose any node wants to transmit a data then it grabs the information of sensor node to transmitting a data from source node to the destination node like for example, a typical geographic-based routing protocol for land-based sensor networks.

VBF is geographical-based routing protocol; actually it is designed for underwater sensor networks [4]. UWSNs are significantly different from terrestrial sensor network as low bandwidth, high latency, high network dynamics. VBF is actually a positioned based routing approach, because it provides robust scalable energy efficient routing approach. Where in which data should be transmitted in vector format Like this there are several routing protocols are implemented, but based on VBF protocols there are several enhancement is done by researchers like HH-VBF, ES-VBF, DS-VBF.

In this paper our proposed protocol is a DS-VBF, recently this protocol is used in under water sensor networks research as we know in VBF protocol for transmitting of data a vector format will be created because of this the nodes which are inside the vector can only transmit the data from source to the sink node else cannot [5], but in DS-VBF it creates a dual sink it mean two sinks are deployed on the surface of the water, because of this each sink can create a separate vectors for transmission of the data, this concept we can also use in wireless sensor network..

II. RELATED WORK

WSN is a built of nodes like hundreds to thousands where each node is connected to one (or some time several nodes) sensor to monitor physical or environmental condition, network nodes are operate on typically several parts like radio transceiver with internal antenna or connection to an external antenna ,a sensor nodes may vary their size , In computer science and telecommunications, wireless sensor networks are an active research area. The topology of WSNs can vary from the simple star network to an multi-hop wireless sensor network.
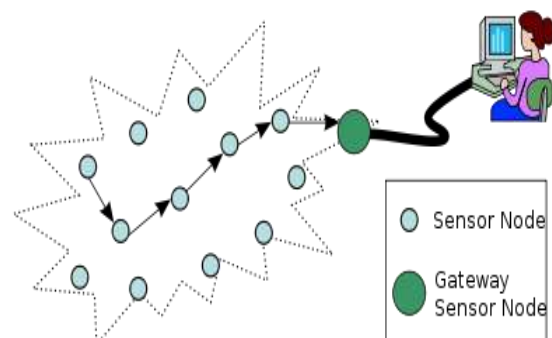

Fig1: Wireless sensor network

In wireless sensor network there are many routing protocols are used to facilitate the research in wireless sensor network it is important to have a standard simulation platform to compare and **evaluate** different network design, algorithm and protocols there is no complete level packet level underwater simulator are published yet, but there are several widely used packet simulator are there such as NS-2,OPNET,Aqua-sim is one of most important and very useful simulator used in Underwater sensor networks,NS2 is used as development plat form for the Aqua-Sim simulator ,where NS2 is very powerful ,and widely used open source simulator in efficiently we can configure the network and nodes ,two languages are used in NS-2,C++and Otal to easily tune the parameters [6].

A. In VBF the position of the sender and the receiver is represented by SP (sender position) FP(forwarder position) TP(target position) respectively. To save energy it is desirable to adjust the forwarding policy based on the local node density, because of mobility of the network it is infeasible to determine global node density ,in aquatic signal it has low propagation speed a self adoption algorithm is used .To allow the each node in the VBF to estimate the density in its neighborhood and adjust it forwarding accordingly[4].

In this algorithm when a node Receives a packet first it calculates its position than it check whether it is in routing pipe, If yes the node then holds the packet for a time interval

$$T \text{ adaptation} = \sqrt{\alpha} * T \text{ delay} + \frac{R-D}{v0}$$

where T delay is a pre-defined maximum delay, $v0$ is the propagation speed of acoustic signals in water.

B. Hop-by-Hop Vector Based Forwarding (HH-VBF):To need to overcome two problem by the VBF a small data delivery ratio in sparse networks and sensitivity to the routing pipe's radius, the HH-VBF (hop-by-hop VBF) is proposed by Nikolaou et al.hop by hop forms the routing pipe in hop by hop format for enhancing the packet delivery ratio significantly. where hop by hop protocol is same as that of VBF but in which it creates a different virtual pipe around the per-hop vector from each forwarder to the sink instead of creating single vector. Due to its hop by hop nature it is not able to add a feedback mechanism to detect and avoid voids in network, the main drawback of HH-VBF is energy efficiency is very low compared to VBF protocol [7].

C. Energy Saving Vector Based forwarding (ES-VBF) :
To solve energy problem in UWSNs Bo et al. put forward an energy-aware routing algorithm, the main purpose of this protocol is to saving energy ES-VBF takes both residual energy and location information into a confederation while calculating the desirableness factor as in, which allows nodes to weigh the benefit for forwarding packets. ES-VBF uses energy aware routing algorithm, in it which allows nodes to weigh the benefit for forwarding packets. the ES-VBF algorithm modifies the calculation of the desirableness factor of (1) for VBF protocol to be calculated if the node residual energy is smaller than 60% of initial energy as

$$\alpha = 0.5 * 1 - \frac{energy}{intialenergy} + \frac{P}{W} + \frac{R - D * \cos\theta}{R}$$

Where *energy* is the residual energy of nodes and initial energy is the initial energy of nodes. main drawback of this protocol is that the residual should be less then 60%,and one more drawback is small falling in packet reception ratio

III.   PROPOSED PROTOCOL

Because to solve the energy problem in under water wireless sensor network a newly proposed protocol called dual sink vector based forwarding protocol is used, where in our proposed model we have taken a Dynamic Source Routing protocol(DSR)is used as basic protocol in this paper a proposed DS-VBF protocol is based on DSR protocol both will have same method of data transmission so that DSR is used as first basic model[9].

A. Dynamic Source Routing protocol (DSR)

 Is a routing protocol for wireless mesh networks. It is similar to AODV in that it forms a route on-demand when a transmitting node requests one. It use a source routing This protocol is truly based on source routing whereby all the routing information is maintained (continually updated) at mobile nodes. It has only two major phases, which are Route Discovery and Route Maintenance.

Where in which suppose a node wants to send a data from source node to the sink,to return the route reply, the destination node must have a route to the source node. If the route is in the Destination Node's route cache, the route would be used. Otherwise, the node will reverse the route based on the route record in the Route Request message header (this requires that all links are symmetric). In the event of fatal transmission, the Route Maintenance Phase is initiated whereby the Route Error packets are generated at a node. , the destination node must have a route to the source node. If the route is in the Destination Node's route cache, the route would be used. Otherwise, the node will reverse the route based on the route record in the Route Request message header (this requires that all links are symmetric). In the event of fatal transmission, the Route Maintenance Phase is initiated whereby the Route Error packets are generated at a node. Like this a DSR will work.

B. Dual Sink Vector Based Forwarding (DS-VBF)

Where as we know this protocol plays very important role in UWSNs especially in energy efficiency and reception ratio, where in UWSNs in which we employs a dual sink at the water surface in different location ,assume that these sink nodes equipped with both acoustic and radio transceivers.

As we know in DS-VBF energy is important corner in which a node wants to send a data from one node to other node ,but in comparing to VBF in which it creates just a single vector to forwarding of packet so while this transmission of packet the which are outside the vector are not allowed to transmit the

data or packet so because of this node which can not transmit the packet their energy will be wasting but by using that DS-VBF protocol by deploying a dual sinks on the water surface it will create dual Vector to transmission of nodes which are for away from the sink now they can also allowed to transmit the packet by this Dual sink method, by this method a energy wasted by the nodes which are away from the vector is maintained ,so DS-VBF uses a remaining energy as to save energy wastage ,so energy is consumed so this method can also be used in wireless sensor network[5] .
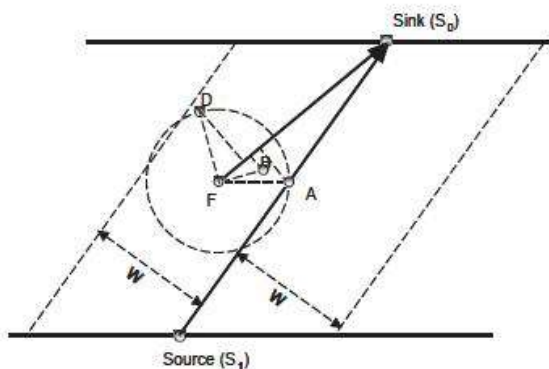

Fig. 2: The forwarding selection in VBF

In DS-VBF target selection is based on the shortest distance from source node to the surface node sink node after selecting the closet node each nodes put the sink location as the destination information in the data packet according to the relative connection location to the sink node based on this method the each node can specify its forwarding path, Each node also makes its own routing virtual pipe which its radius is equal to transmission range. When node receives a data packet it will calculate its relative position to the forwarder node by measuring the distance to the forwarder node and angle of arrival (AOA) to the signal.

So as by knowing about DS-VBF it is very important protocol used to save the energy, and end to end delay is reduced, packet reception ratio is also an important factor in DS-VBF, so our main focus is to providing security to the DS-VBF protocol while transmission of data because while saving energy, reducing delay is main priority factors but apart from this security is very important corner for securing the transmitting data in wireless sensor network..

IV.   CONCLUSION

The main use of the DS-VBF is to increase the number of nodes for data transmission, this protocol is used in UWSNs research in which instead of deploying the single sink on the water surface deployed a dual sink on it ,because of this deployment in VBF protocol the nodes which are near to the vector or which are inside vector can participated in data forwarding process, and their energy is consumed, but nodes which are far away from the vector or sink are not able to participate in data forwarding process, so by deploying dual sink nodes which are ar way from the sink are able to participate in data transmission, because of this packet reception ratio will increase significantly and average end to end delay decrease.

It means that in VBF that conceder only location information but in DS-VBF it takes both residual energy location information as priority factors ,in remaining energy is less than the minimum energy it will drop the packet ,and providing security is very important corner in wireless sensor network while data transmission.

REFERENCES

[1] Improvement of Energy Consumption and Load Balance for LEACH in Wireless Sensors Networks Thu Ngo Quynh1, Kieu-Ha Phung2,3,Hoan Vu Quoc1 School of Information and Communication Technology.

[2] Ian F. Akyildiz, Weilian Su Yogesh Sankara subramaniam,and Erdal Cayirci Georgia Institute of Technology.

[3] DBR: Depth-Based Routing for Underwater Sensor Networks.Hai Yan, Zhijie Jerry Shi, and Jun-Hong Cui Department of Computer Science and Engineering University of Connecticut, Storrs, CT 062692155Emails:{hay04002,zshi,jcui}@engr.uconn.edu

[4] VBF:Vector-Based Forwarding Protocol for Underwater Sensor Networks. Peng Xie1 and Jun-Hong Cui1 and Li Lao2 Computer Science & Engineering Dept., University of Connecticut, CT 06029,Computer Science Dept.,University of California, Los Angeles, CA 90095 fxp,jcuig@engr.uconn.edu, llao@cs.ucla.edu.

[5] DS-VBF: Dual Sink Vector-Based Routing Protocol for Underwater Wireless Sensor Network Maryam Pouryazdanpanah K., Mohammadfazel Anjomshoa∗, Ahmad Salehi S, Amir Afroozeh, Marjan Moshfegh G.Faculty of Computing, Universiti Teknologi Malaysia (UTM), Skudai, 81300 Johor , Malaysia e-mail:{pkmaryam2, amohammadfazel2,mgmarjan2} @live.utm.my Faculty of Engineering and Science, Queensland University of Technology (QUT), Brisbane QLD 4000, Australia e-mail: a.salehishahraki@qut.edu.au Aqua-Sim: An NS-2 Based Simulator for Underwater Sensor Networks.

[6] Peng Xie, Zhong Zhou, Zheng Peng, Hai Yan, Tiansi Hu, Jun-Hong Cui, Zhijie Shi, Yunsi Fei, Shengli Zhou Underwater Sensor Networks Lab University of Connecticut, Storrs, CT 06269-2155.

[7] REBAR: A Reliable and Energy Balanced Routing Algorithm for UWSNs.Jinming Chen, Xiaobing Wu and Guihai Chen State Key Laboratory for Novel Software Technology Nanjing University ,Nanjing, Jiangsu 210093, P. R. China {cjm,wuxb}@dislab.nju.edu.cn, gchen@nju.edu.cn.

[8] Enhancing the Vector-Based Forwarding Routing Protocol for Underwater Wireless Sensor Networks: A Clustering Approach Dina M. Ibrahim, Tarek E. Eltobely, Mahmoud M. Fahmy, and Elsayed A. Sallam, Computers and Control Engineering Department ,Faculty of Engineering, Tanta University Tanta, Egypt emails: {dina.mahmoud@f-eng.tanta.edu.eg, tarekt@f-eng.tanta.edu.eg, mfn_288@hotmail.com, and sallam@f-eng.tanta.edu.eg}.