Void Node Avoidance and Opportunistic Routing For Wireless Sensor Network

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ABSTRACT

Underwater wireless sensor networks (UWSNs) are becoming more popular everyday due to their major and important role in different area, such as underwater changes monitoring. Also in Monitoring the aquatic environment, monitoring of marine life, pollutant contain, climate, oilfields, tsunamis, navigation assistance. To understand and learn these things, we need to study the actual changes happen in underwater environment as well as we need to improve the data gathering of UWSNs. But the data gathering of UWSNs is still limited at some range just because of the acoustic channel communication characteristics. One simple way to improve data gathering of UWSNs is through unique routing protocol. In these Project, we propose the GEDAR routing protocol for UWSNs. GEDAR is geographic and opportunistic routing protocol that routes data packets which contain some information from sensor nodes to multiple sinks at the sea's surface. When the node is in a void region communication, GEDAR switch to recovery mode procedure. This procedure is based on topology control through the depth adjustment of void nodes. Implemented setup shows that the sensor information will encrypted and received at destination completely.

***Keywords*— Graphical Routing, Local Minimum Problem, Topology Control, Underwater Sensor Network,Void Node Avoidance**.

I.INTRODUCTION

In our earth 25% covered by human being and remaining space is covered by water that can be river as well as oceans. Suppose a scientist work on particular a particular thing so some special devices should be in underwater wireless sensor network that can work in underwater wireless sensor network system which should be able to interact within underwater. Today increasing the demand some special routing protocol which can work into underwater wireless sensor network. For the current point of research scenario underwater sensor network with some different routing protocol available that play some specific role in the underwater wireless sensor network that why some scientists are working for developing algorithm Underwater routing sensor network not only helpful for giving high reliability which should be able to control high reliability of information sent to the SINK node but also its delay relatively low. Underwater sensor network able to perform operation into long terms non time critical aquatic monitoring applications where GPS support is not required.The architecture of routing protocols easily adapt to changing topology. Reduce energy consumption and the network nodes network conflicts as much as possible. Some main challenges are also including for routing protocol underwater sensor network that challenges are High propagation delays, Node mobility, Error prone acoustic underwater channels, Error prone acoustic underwater channels, Error prone acoustic underwater channels. Following figure illustrates the difference between UWSNs and WSN.

Property	Underwater Wireless Sensor Network	Wireless Sensor Network
Type of communication	Acoustic signals	Wireless signals
Energy harvesting	Energy of the oceanic waves could be used for energy generation	Solar and wind energy is tapped in some applications
Medium characteristics	Acoustic signals being mechanical waves are very slow and travel at a speed of 1500 m/s only.	Wireless signals travel at the speed of light being electromagnetic in nature
Routing challenges	Long propagation delay of the signals needs multi hop transmission to be limited	Multihop data transmission causes data redundancy, but the system is more fault tolerant

Fig. 1. Difference Between UWSNs and WSN

SR NO	Paper title	Year	Algorithm used	Disadvantage
1	VBF: vector-based forwarding protocol for UWSN	2006	Vector-based forwarding protocol	Acoustic channel can be overloaded
2	DBR: depth-based routing for UWSN	2008	Depth-based routing protocol	Do not employ any void node recovery.
3	VAPR: Void-Aware Pressure Routing for UWSN	2013	Void-Aware Pressure Routing protocol	Expensive in terms of energy
4	Hydro-cast : Pressure Routing protocol for UWSN	2015	Hydraulic pressure-based routing protocol	Expensive in terms of energy

Fig. 2. Literature Surve

II.LITERATURE SURVEY

Underwater sensor networks: applications, advances and challenges

Authors: J. Heidemann, M. Stojanovic, and M. Zorzi

Description: the main approaches and challenges in the design and implementation of underwater wireless sensor networks. We summarize key applications and the main phenomena related to acoustic propagation, and discuss how they affect the design and operation of communication systems and networking protocols at various layers. We also provide an overview of communications hardware, test beds and simulation tools available to the research community.

Multi-objectivization-based localization of underwater sensors using magnetometers

Authors: Z. Yu, C. Xiao, and G. Zhou

Description: Underwater sensor networks are necessary to detect and track unknown targets in the maritime environment. Localization of sensors becomes a crucial problem. This paper presents a new method based on multi-objectification to localize the sensors using triaxial magnetometers. In this localization system, a DC current-carrying solenoid coil serves as a magnetic source and the inertial magnetometer measure the three-component of magnetic flux intensity.

A survey of architectures and localization techniques for underwater acoustic sensor networks

Authors: Y. Ren, W. K. G. Seah, and P. D. Teal

Description: The widespread adoption of the Wireless Sensor Networks (WSNs) in various applications in the terrestrial environment and the rapid advancement of the WSN technology have motivated the development of Underwater Acoustic Sensor Networks (UASNs). UASNs and terrestrial WSNs have several common properties while there are several challenges particular to UASNs that are mostly due to acoustic communications, and inherent mobility.

GEDAR: geographic and opportunistic routing protocol with depth adjustment for mobile underwater sensor networks

Authors: R. W. L. Coutinho, A. Boukerche, L. F. M. Vieira, and A. A. Loureiro

Description: Efficient protocols for data packet delivery in mobile underwater sensor networks (UWSNs) are crucial to the effective use of this new powerful technology for monitoring lakes, rivers, seas, and oceans. However, communication in UWSNs is a challenging task because of the characteristics of the acoustic channel. In this work, we present a feasible solution for improving the data packet delivery ratio in mobile UWSN.

III.BASIC IDEA AND ARCHITECTURE

GEDAR uses the greedy forwarding strategy to advance the packet , at each hop,towards the surface sonobuoys. recovery mode procedure based on the depth adjustment of the void node is used to route data packet when it get stuck at a void node. When a node is in a communication void region, GEDAR moves it to a new depth to resume the greedy forwarding strategy. To the best of our knowledge, GEDAR is the first routing protocol proposed for mobile underwater sensor networks to consider the depth adjustment capability of the sensor nodes to deal with communication void region problem. 1^{st} Algorithm is an enhanced periodic beaconing used by GEDAR to broadcast periodic beacons and to handle received beacons. The Algorithm of Periodic Beaconing is that each node obtains the location information of its neighbors and reachable sonobuoys.

During the transmissions, each node locally determines if it is in a communication void region by examining its neighbor hood. If the node is in a communication void region, that is, if it does not have any neighbor leading to a positive progress towards some surface sonobuoy , it announces its condition to the neighborhood and waits the location information of two hop nodes in order to decide which new depth it should move into and the greedy forwarding strategy can then be resumed. After, the void node determines a new depth based on 2-hop connectivity such that it can resume the greedy forwarding.

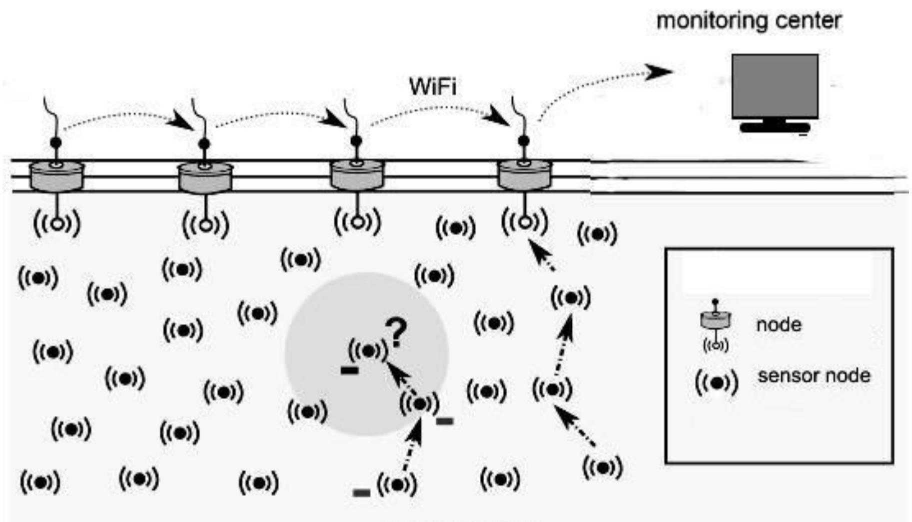

Fig. Basic Architecture

Void node recovery procedure is used when the node fails to forward data packets using the greedy forwarding strategy. Instead of message-based void node recovery procedures, GEDAR takes advantage of the already available node depth adjustment technology to move void nodes for new depths trying to resume the greedy

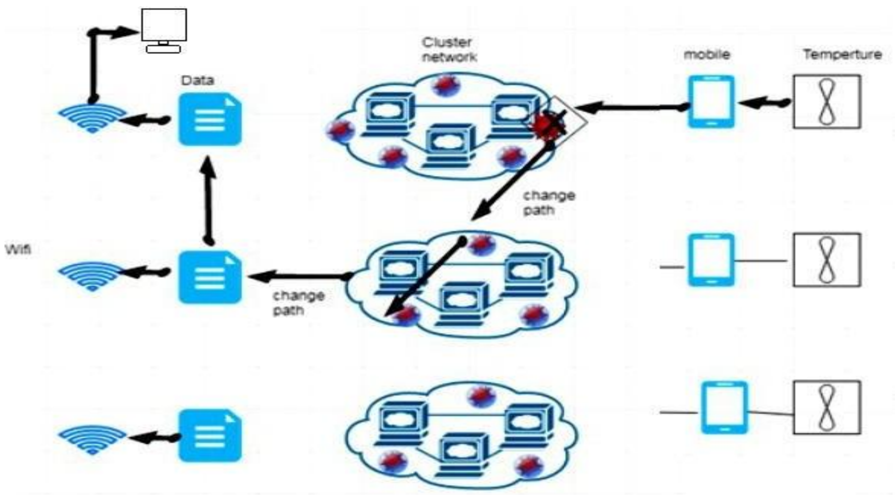

Fig. 3 Proposed Demo Architecture

forwarding. We advocate that depth- adjustment based topology control for void node recovery is more effective in terms of data delivery and energy consumption than message-based void node recovery procedures in UWSNs.

In the recovery mode procedure, the void node changes its status, stops the beaconing, sends a void node announcement message to announce its void node condition to the neighborhood. GEDAR uses opportunistic routing to deal with underwater acoustic channel characteristics. In traditional multihop routing paradigm, only one neighbor is selected to act as a next-hop forwarder. If the link to this neighbor is not performing well, a packet may be lost even though other neighbor may have overheard it. In opportunistic routing, taking advantage of the shared transmission medium, each packet is broadcast to a forwarding set composed of several neighbors.The packet will be re-transmitted only if none of the neighbors in the set receive it. Opportunistic routing (OR) has advantages and disadvantages that impact on the network performance. OR reduces the number of possible re transmissions ,the energy cost involved in those re-transmissions, and help to decrease the amount of possible collisions. However, as the neighboring nodes should wait for the time needed to the packet reaches the furthest node in the forwarding set, OR leads to a high end-to-end latency.

IV.FLOW CHART

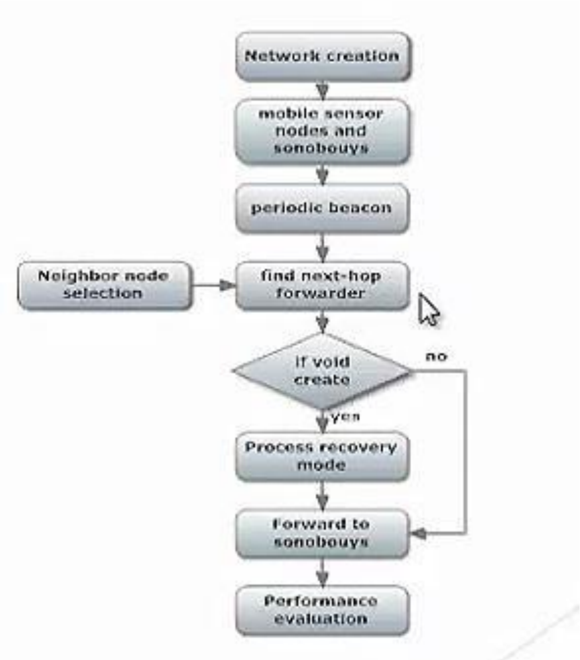

Fig. 4. Flow Chart

Above Flowchart illustrate how the System Model works. we have a large number of mobile underwater sensor nodes at the ocean bottom and sonobuoys, also named sinks nodes, at the ocean surface. through periodic beaconing that each node obtains the location information of its neighbors and reachable Sonobuoys. we need an efficient beaconing algorithm that keeps the size of the periodic beacon messages short as possible.periodic beaconing used by GEDAR to broadcast periodic beacons and to handle received beacons. GEDAR uses opportunistic routing to deal with underwater acoustic channel characteristics. In traditional multihop routing paradigm, only one neighbor is selected to act as a next-hop forwarder. If the link to this neighbor is not performing well, a packet may be lost even though other neighbor may have overheard it. In opportunistic routing, taking advantage of the shared transmission medium, each packet is broadcast to a forwarding set composed of several neighbors. The packet will be retransmitted only if none of the neighbors in the set receive it.

Void node recovery procedure is used when the node fails to forward data packets using the greedy forwarding strategy. Instead of message-based void node recovery procedures. Depth adjustment based topology control for void node recovery is more effective in terms of data delivery and energy consumption than message-based void node recovery procedures in UWSNs.

V.MATHEMATICAL MODEL

Let W be the whole system which consists: W= {IP, PRO, OP}

Where,

IP is the input of the system.

A) IP= {SN, RN, V}

1. SN is the set of number of sensing nodes in the system.
2. RN is the sensing data sensed from the receiver node.
3. V is the void Node .

B) PRO is the procedure of our proposed system:

Step 1: At first the wireless sensor network which senses the nodes and transmits the data to a receiver database system. Step 2: sender node send request to nearest nodes.

Step 3: Which nearest node is response first that node through send the data.

Step 4:In this node, any void node is occurred .that time that route will be removed.

Then next nearest node will be considered.

C) OP is the output of the system:

The system provides the wireless sensible data available on the database system in the sense of inside attacks.

VI.CONCLUSIONS

Opportunistic routing is the most promising routing method in UWSNs due to the unique characteristics of underwater environments. Opportunistic routing protocol is composed of three main algorithms, namely, forwarding set selection and Forwarding. GEDAR is a simple and scalable geographic routing protocol that uses the position information of the nodes and takes advantage of the broadcast communication medium to greedily and opportunistically forward data packets towards the sea surface sonobuoys. Simulation results showed that this new algorithm improves the data packet delivery ratio when compared with the baseline routing protocols Also GEDAR significantly improves the network performance when compared with the baseline solutions, even in hard and difficult mobile scenarios of very dense networks.

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