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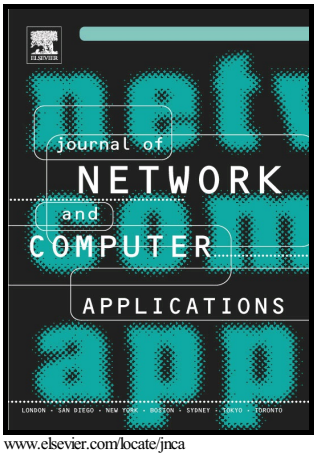

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Energy Efficient Chain Based Routing Protocol for Underwater Wireless Sensor Networks

Shalli Rani[1], Jyoteesh Malhotra[2], Rajneesh Talwar[3], and Syed Hassan Ahmed[4]
[1]Research Scholar, Department of Computer Applications, IKG Punjab Technical University, Kapurthala-144601, India; Email: shalli@ssdwit.org
[2]Department of ECE, GNDU Regional Campus, Jalandhar (Pb.), India
Email: jyotessh@gmail.com
[3]Department of ECE, CGC Jhenjeri Technical Campus, Mohali (Pb.), India
Email: rtphdguidance@gmail.com
[4]School of Computer Science & Engineering, Kyungpook National University, Daegu 702-701, Korea;
Email: hassan@knu.ac.kr

***Abstract*- To explore the vast ocean, internet of underwater things has become the most attractive area of research. Underwater Smart things are deployed to facilitate the discovery of unexplored regions of ocean. Unique characteristics of underwater wireless sensor networks pose many constraints in transmission of data packets and energy efficient routing is one of them. Motivated by the significance of less costly energy efficient routing protocol, we propose energy efficient chain based routing protocol for underwater wireless sensor networks (E-CBCCP). While keeping in view the complex features of underwater dynamics, dynamic network topology and node mobility, energy of the cluster heads (CHs), relay nodes (RNs) and cluster coordinators (CCOs) has been considered during the transmission of data and role of the CHs, CCOs and RNs is changed after some time duration to maintain the load on the nodes. Distance based communication is based on the location aware nodes and can be used in monitoring domains during steady state but in dynamic state, location free communication is required therefore RN communication is based on hop to hop. Confidence level of the sensor nodes is computed to select the optimal RN and to improve the reliability. New prototype has shown the improvement over CARP a routing protocol in terms of data packets transmission and energy. Simulations in MATLAB validate our methodology which has decreased the communication cost of sensor nodes and hence prolonged the network lifetime.**

Keywords: Chain Based routing protocol; UWSNs; Relay node election algorithm; energy efficient communication;

I. INTRODUCTION

Life of the people is mostly exaggerated by the ocean as 3/4th part of the earth's surface is covered by the water. The environment conditions are also affected by the ocean at the large extent. Its importance has been well realized by the people but only tiny (nearly 1%) portion of the ocean has been explored till date. Harsh conditions of the underwater are the reasons behind it [1-3]. Familiarity with underwater is very less as compared to the land. Underwater environment is unexplored at utmost, and it has become crucial to discover unexplored region for the past decades [4]. With the advancement in sensor technologies, wireless sensor network (WSN) is playing an important role in underwater applications and underwater WSNs (UWSNs) (figure 1) is drawing attention of the researchers to invent the promising solutions for the exploration of underwater environment. UWSNs are providing the techniques for the communication and transmission of the information underwater. UWSNs are used in many applications where physical objects (sensor nodes (SNs)) collaboratively sense and monitor historical and contemporary information with energy efficiency [5-6]. These SNs are sonobuoys on the water surface to facilitate the communication and forwarding of data to the sink node. The sensor network of smart underwater objects gives rise to the internet of underwater things (IoUT) to contribute an insight to the unexplored ocean [7] to provide the solutions for diverse applications (industrial, security, scientific etc. domains). Already developed techniques of terrestrial WSN (TWSNs) cannot apply to the UWSN directly as both networks conditions are different in many aspects. Some of the contrasts of both networks are outlined as below in table 1.