

Received May 11, 2019, accepted May 30, 2019, date of publication June 10, 2019, date of current version July 2, 2019.

Digital Object Identifier 10.1109/ACCESS.2019.2921833

Adaptive Energy Aware Quality of Service for Reliable Data Transfer in Under Water Acoustic Sensor Networks

REVATHI SUNDARASEKAR¹, P. MOHAMED SHAKEEL², S. BASKAR³, SEIFEDINE KADRY⁴,
GEORGE MASTORAKIS⁵, CONSTANDINOS X. MAVROMOUSTAKIS⁶,
R. DINESH JACKSON SAMUEL⁷, AND VIVEKANANDA GN⁸

¹ Anna University, Chennai 600025, India

² Faculty of Information and Communication Technology, Universiti Teknikal Malaysia Melaka, Durian Tunggal 76100, Malaysia

³ Department of Electronics and Communication Engineering, Karpagam Academy of Higher Education, Coimbatore 641021, India

⁴ Department of Mathematics and Computer Science, Faculty of Science, Beirut Arab University, Beirut 11072809, Lebanon

⁵ Department of Business Administration, Technological Educational Institute of Crete, 72100 Heraklion, Greece

⁶ Department of Computer Science, University of Nicosia, 24005 Nicosia, Cyprus

⁷ School of Computing Science and Engineering, Vellore Institute of Technology University, Chennai 600127, India

⁸ Department of Computer Science and Engineering, MITS, Madanapalle 517325, India

Corresponding authors: Revathi Sundarasekar (revathisundar161@outlook.com) and George Mastorakis (gmastorakis@staff.teicrete.gr)

This work was supported in part at the Ambient Assisted Living (AAL) Project vINCI: Clinically-Validated INtegrated Support for Assistive Care and Lifestyle Improvement: the Human Link through the Research Promotion Foundation (RPF) in Cyprus of the AAL Framework under Grant vINCI/P2P/AAL/0217/0016.

ABSTRACT Currently, reliable data transfer, and energy management have been considered as a significant research challenge in the underwater acoustic sensor networks (UWASN) owing to high packet loss, limited ratio of bandwidth with significant incur of energy, network life time with high propagation delay, less precision with high data hold time and so on. Energy saving and maintaining quality of service (QoS) is more important for UWASN owing to QoS application necessity and limited sensor nodes. To address this issue, several existing algorithms such as adaptive data forwarding algorithms, QoS-based congestion control algorithms and several methodologies were proposed with high throughput and less network lifetime as well as the less utilization of energy in UWASN by choosing sensor nodes data based on data transfer and link reliability. However, all the conventional algorithms have fixed data hold time, which incurs more end-to-end delay with less reliability of data and consumption of high energy due to high data transfer reachability. This high end research proposes adaptive energy aware quality of service (AEA-QoS) algorithm for reliable data delivery by formulating discrete times stochastic control process and deep learning techniques for UWSAN to overcome these issues. The proposed algorithm has been validated with conventional state-of-the-art methods and results show that the proposed approach exhibits its effectiveness in terms of less network overhead and propagation delay with high throughput and less energy consumption for every reliable packet transmission.

INDEX TERMS Under water acoustic sensor networks, reliable data transfer, quality of service (QoS), deep learning.

I. INTRODUCTION

Two-third portions of the earth surfaces are covered with water [1]. In the recent year's research on UWASN management has attracted significant attention to the industries and researchers due its applications in assisted navigation, data

collection and off-shore/On-shore exploration, surveillance and pollution monitoring in ocean etc...[2] the unmanned exploration is required because human manifestation impossible for monitoring and control. Now, UWASN has gained its importance whereas existing methods for terrestrial Wireless sensor networks (WSN) and Ad-hoc systems remain inappropriate for underwater application owing to its distinctiveness between communication medium and other characteristics in

The associate editor coordinating the review of this manuscript and approving it for publication was Guangjie Han.