



Review

A survey on routing techniques in underwater wireless sensor networks

Muhammad Ayaz*, Imran Baig, Azween Abdullah, Ibrahima Faye

CIS Department, EE Department, FAS Department, Universiti Teknologi PETRONAS, Malaysia

ARTICLE INFO

Article history:

Received 14 March 2011

Received in revised form

23 May 2011

Accepted 19 June 2011

Available online 29 June 2011

Keywords:

Underwater sensor networks
 Underwater acoustic communications
 Routing protocols
 Resource-aware routing
 Classification of protocols

ABSTRACT

Underwater Wireless Sensor Networks (UWSNs) are finding different applications for offshore exploration and ocean monitoring. In most of these applications, the network consists of significant number of sensor nodes deployed at different depths throughout the area of interest. The sensor nodes located at the sea bed cannot communicate directly with the nodes near the surface level; they require multi-hop communication assisted by appropriate routing scheme. However, this appropriateness depends not only on network resources and application requirements but also on environmental constraints. All these factors provide a platform where a resource-aware routing strategy plays a vital role to fulfill the different application requirements with dynamic environmental conditions. Realizing the fact, significant attention has been given to construct a reliable scheme, and many routing protocols have been proposed in order to provide an efficient route discovery between the sources and the sink. In this paper, we present a review and comparison of different algorithms, proposed recently in order to fulfill this requirement. The main purpose of this study is to address the issues like data forwarding, deployment and localization in UWSNs under different conditions. Later on, all of these are classified into different groups according to their characteristics and functionalities.

© 2011 Elsevier Ltd. All rights reserved.

Contents

1. Introduction	1909
1.1. Related work and contribution	1909
2. Background	1910
2.1. Basics of acoustic communications	1910
2.2. Deployment and network architecture	1910
2.3. Localization	1911
2.4. Reliability	1911
3. Problems in existing terrestrial routing protocols	1912
4. Routing protocols for UWSNs	1912
4.1. Vector based forwarding (VBF)	1912
4.2. Focused beam routing (FBR)	1913
4.3. Reliable and Energy Balanced Routing Algorithm (REBAR)	1914
4.4. Information-Carrying Routing Protocol (ICRP)	1914
4.5. Directional Flooding-Based Routing (DFR)	1915
4.6. Distributed Underwater Clustering Scheme (DUCS)	1915
4.7. Depth Based Routing (DBR)	1916
4.8. Sector-based Routing with Destination Location Prediction (SBR-DLP)	1916
4.9. Multipath virtual sink architecture	1916
4.10. Hop-by-Hop Dynamic Addressing Based Routing (H2-DAB)	1917
4.11. Mobile delay-tolerant approach (DDD)	1917
4.12. Efficient data delivery with packet cloning	1918
4.13. Resilient routing algorithm for long-term applications	1918
4.14. Pressure routing for underwater sensor networks (HydroCast)	1918

* Corresponding author.

E-mail address: ayazsharif@hotmail.com (M. Ayaz).