

Cross Layer Based Cooperative Communication Protocol for Improving Network Performance in Underwater Sensor Networks

Kihyun Kim, Sunmyeng Kim^{*}

Department of Computer Software Engineering, Kumoh National Institute of Technology, Korea

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Abstract

For underwater sensor networks (USNs), cooperative communications have been introduced to improve network performance with the help of relay nodes. The previous cooperative communications select the best relay node on a hop-by-hop basis. Therefore, they have limitations in improving performance. In order to get better performance, a cooperative communication protocol based on the cross layer is proposed in this paper. The proposed protocol uses the information provided by a routing protocol at the network layer for the erroneous data packet delivery. It selects one with the minimum routing cost among relay candidate nodes. The routing protocol in the selected relay node provides the MAC layer with the address of the next hop node on the path to the sink node. Then, the MAC layer in the selected relay node forwards the erroneous data packet to the next hop node rather than a receiver node. Performance studies are carried out through simulation. Simulation results show that the proposed protocol has about 21.8% lower average delay and about 14.4% lower average number of nodes passed than the previous protocol, regardless of the maximum transmission range.

Keywords: cooperative communication, cross layer, MAC, routing, USN

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^{*} Corresponding author. E-mail address: sunmyeng@kumoh.ac.kr

Tel.: +82-54-478-7547; Fax: +82-54-478-7539

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