Normalized advancement based totally opportunistic routing algorithm with void detection and avoiding mechanism for underwater wireless sensor network

ABSTRACT

Underwater wireless sensor network (UWSN) is the enabling technology for a new era of underwater monitoring and actuation applications. In this network, data aggregation and forwarding are intensely constrained due to channel impairment, and therefore require due consideration. One way to address the data collection of UWSN is by enhancing the routing protocol using the Opportunistic Routing (OR) technique. This article proposes a normalized advancement based opportunistic routing protocol called NA-TORA. NA-TORA is a geographically opportunistic routing protocol in which the next-hop forwarder is selected based on Normalized Advancement (NA). NA is calculated from Expected Transmission Count (ETX) and node' s energy consumption to find an optimal forwarding node. However, the forwarded data may not be received on the designated sink node due to the existence of a void node in the data forwarding route. To overcome the issue of void nodes, we have incorporated a void node detection and avoiding mechanism on NA-TORA, called NA-TORA with VA. The proposed scheme recursively detect void nodes and avoid these nodes to participate in data routing by utilizing the angle of transmission adjustment and transmission range extension method. The novelty of this work lies within its data transmission phase, where normalized advancement is used to select a potential candidate forwarder. Apart from that, the proposed routing protocol operates in two different modes, i.e., standard operating mode (NA-TORA), and void avoidance mode (NA-TORA with VA). Comprehensive simulations were performed to compare the performance of NA-TORA and NA-TORA with VA with some well-known existing routing protocols.

Keyword: Routing; Routing protocols; Wireless sensor networks; Data communication; Monitoring; Energy consumption