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Hybrid Optimization of Developed DEEC Protocol for Enhanced Energy Efficiency in IoUT

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Abstract

On the Internet of Underwater Things (IoUT), underwater nodes (UNs) have limited power supplies, and the underwater environment poses challenges to such applications, making energy efficiency and network stability critical. The Optimized Distributed Energy-Efficient Clustering (ODDEEC) protocol is presented in this study. It offers improved energy efficiency and routing decisions by combining Q-learning with Artificial Bee Colony (ABC) optimization. Detailed simulations have been conducted to evaluate how well the approach will perform over time. According to the results, ODDEEC performs noticeably better in terms of energy usage, packet delivery ratio, and network lifetime than other protocols, including Developed DEEC (DDEEC) and Distributed Energy Efficient Clustering (DEEC). Using the artificial bee colony (ABC) algorithm for adaptive resource management and Q-learning for dynamic routing optimization, the proposed protocol makes it possible for ODDEEC to maintain network sustainability and stability even with extended operational overhead. The results show that the ODDEEC reduces the network energy consumption by 13.64% and 25% for DDEEC and DEEC respectively. This overall performance demonstrates the hybrid approach's efficiency, which makes it an enhanced solution to energy consumption in 10 Utnetworks. © 2024 IEEE.

Author Keywords

ABC; Clustering Approach; DDEEC; DEEC; IoUT; Meta-heuristic; ODDEEC; Q-learning

Index Keywords

Dynamic routing algorithms, Energy utilization, Routing protocols; Artificial bee colony, Artificial bees, Clustering approach, Developed DEEC, Distributed energies, Distributed energy efficient clustering, Energy Efficient clustering, Lout, Metaheuristic, Optimized distributed energy-efficient clustering, Q-learning; Resource allocation

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