Low Energy Routing Protocol for Oil and Gas Pipeline Internet of Things

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Abstract

Nodes in the Internet of Things of oil and gas pipelines are linearly distributed according to the direction of pipelines, so it is difficult to realize timely and large-scale battery replacement. Therefore, effective energy management has always been a key factor restricting the performance of the IoT of oil and gas pipelines. In addition, the end-to-end delay determines the response time of pipeline safety accidents and is also a key parameter to improve the real-time performance of the network. Considering energy efficiency and delay comprehensively, this paper proposes PIOT-LPRP (Pipeline Internet of Things - Low Power Routing Protocol) protocol. The remaining energy of nodes and the distance between nodes and sink nodes are used as indicators to select candidate forwarding nodes in opportunistic routing to achieve energy balance in the network. The use of energy collection technology to extend the service life of the network. By choosing the node which is far away from the transmission as the forwarding node, the number of hops of data transmission can be effectively reduced, so as to reduce the end-to-end delay of the network. The simulation results show that PIOT-LPRP can effectively take into account the network life and network latency, and improve the network performance, by comparing with the classical opportunistic routing protocol EXOR, the same type of protocol RE-OR, and the HER protocol using energy harvesting technology.

Full Text

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