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## Resilient IEEE802.15.4MAC protocol for multi-hop mesh wireless sensor network (Article)

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### Abstract

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The success of a modern power grid system is inevitably based on the integration of a smart data exchange amid several devices in power production, transportation, dispatching and loads. For large coverage data exchange, a distributed multi-hop mesh is structured from low voltage distribution boards to the substations. Thus, being cheap, less power intake, easy set-up and operating in a free licensed spectrum, ZigBee/IEEE802.15.4 makes the most suitable wireless protocol for communicating in power grid systems. Nevertheless, IEEE802.15.4MAC protocol lacks a mechanism to enable a multi-hop mesh network with efficient energy and quality of service (QoS). Hence, in this paper, a Multi-Hop Mesh IEEE802.15.4MAC protocol is designed for a large coverage data exchange. This developed model provides a resilient network with energy efficiency and QoS. Hence, the IEEE802.15.4 super frame standard structure is modified by swapping the contention free period (CFP) and contention access period (CAP) for time sensitive applications. For network resilience, a Reserved Broadcast Duration Slot (RB DS) is introduced in the active super frame standard structure as beacon offset reference time computation. Finally, for the network performance analysis, the developed Markov chain Model with retry and saturated traffic regime without feedback is run on NS-2 simulator. Here, the hidden terminal problem is not considered since it is assumed that all nodes can "hear" each other. The simulation results are encouraging as the developed IEEE802.15.4MAC protocol is capable of improving the time delivery delay up to 35.7%.

### Author keywords

IEEE802.15.4MAC protocol Multi-hop mesh Resilient Wireless sensor network Zigbee

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