NOVEL SLEEP SCHEDULING TO REDUCE BROADCASTING DELAY DURING CRITICAL EVENT MONITORING IN WIRELESS SENSOR NETWORKS

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ABSTRACT

In this paper, we focus on critical event monitoring in wireless sensor networks (WSNs), where only a small number of packets need to be transmitted most of the time. When a critical event occurs, an alarm message should be broadcast to the entire network as soon as possible. To prolong the network lifetime, some sleep scheduling methods are always employed in WSNs, resulting in significant broadcasting delay, especially in large scale WSNs. In this paper, we propose a novel sleep scheduling method to reduce the delay of alarm broadcasting from any sensor node in WSNs. Specifically, we design two determined traffic paths for the transmission of alarm message, and *level-by-level offset* based wake-up pattern according to the paths, respectively. When a critical event occurs, an alarm is quickly transmitted along one of the traffic paths to a center node, and then it is immediately broadcast by the center node along another path without collision. Therefore, two of the big contributions are that the broadcasting delay is independent of the density of nodes and its energy consumption is ultra low. Exactly, the upper bound of the broadcasting delay is only $3D+2L$, where D is the maximum hop of nodes to the center node, L is the length of sleeping duty cycle, and the unit is the size of time slot. Extensive simulations are conducted to evaluate these notable performances of the proposed method compared with existing works.

KEYWORDS: Broadcasting Delay, Critical Event Monitoring, Multi-Channels, Sleep Scheduling Wireless Sensor Network (WSN)