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Abstract
Wireless sensor networks are composed of a group of geographically dispersed sensor nodes and a sink node, which can be utilized in military application and environmental observation of scientific research. Sensor nodes route the collected data to the sink node via multi-hop wireless links. Batteries usually serve as the power source for sensor nodes and typically can not be recharged or replaced when the energy is exhausted. Therefore, how to efficiently utilize the energy and thus prolong the overall life time of a sensor network is an important issue. In the past, the chain architecture proposed in PEGASIS is demonstrated to succeed in prolonging the life time of a sensor network. However, it incurs significant propagation delay in transmitting sensed data to the sink node. In this paper, we propose a novel data gathering scheme based on a chain-oriented grid architecture, called Grid Chain
(G-Chain). Through the proposed G-Chain scheme, we restrict the transmission distance between nodes to prevent the energy consumption from being proportional to the transmission distance to the fourth power. In addition, we also use the determining the best data-gathering chain algorithm to form chain in the cells, thereby effectively reducing the transmission delay. The simulation results show that our proposed approach can achieve energy efficiency, especially when sensor nodes are densely deployed. Moreover, the G-Chain can also reduce delay in data transmission, balance the energy consumption among sensor nodes, and prolong the life time of a sensor network.
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