ANALYSIS OF THROUGHPUT CAPACITY AND DELAY IN WIRELESS SENSOR NETWORK

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We investigated throughput capacity and the average delay of a wireless sensor network (WSN) with multiple static sinks. WSNs such as smart buildings or environment monitors are growing in scale. Indeed, developing multiple base stations to gather data with less packet loss is necessary. In this study, two location distributions including popular-location scheme and random scheme were applied to investigate the effect of sink location on the network parameters. In popular-location scheme, base stations are located around the popular points (most visited locations) according to location popularity rule. However, in the random scheme, sinks are distributed randomly. We developed a cell-partitioned model on a multi-sink WSN to manage the signal interference. Assuming a Poisson packet arrival rate and modifying the Grossglauser-Tse 2-hop relay algorithm, we obtained a tight bound for throughput capacity and delay of the network. Furthermore, we analyzed the trade-off between throughput capacity and delay in different conditions of the network and we showed that trade-off is bounded by O(N), where N is defined as the number of nodes in the network. Moreover, the effect of redundancy on throughput capacity and delay was determined and the results showed that having redundancy (having more than one copy of the packet) improved the average network delay.