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# Evaluating Service Disciplines for On-Demand Mobile Data Collection in Sensor Networks

## Abstract:

Mobility-assisted data collection in sensor networks creates a new dimension to reduce and balance the energy consumption for sensor nodes. However, it also introduces extra latency in the data collection process due to the limited mobility of mobile elements. Therefore, how to schedule the movement ofmobile elements throughout the field is of ultimate importance. In this paper, the on-demand scenario where data collection requests arrive at the mobile element progressively is investigated, and the data collection process is modelled as an M/G/1/c-NJN queuing system with an intuitive service discipline of nearest-job-next (NJN). Based on this model, the performance of data collection is evaluated through both theoretical analysis and extensive simulation. NJN is further extended by considering the possible requests combination (NJNC). The simulation results validate our models and offer more insights when compared with the first-come-first-serve (FCFS) discipline. In contrary to the conventional wisdom of the starvation problem, we reveal that NJN and NJNC have better performance than FCFS, in both the average and more importantly the worst cases, which offers the much needed assurance to adopt NJN and NJNC in the design of more sophisticated data collection schemes, as well as other similar scheduling scenarios.