

## Energy Efficient Massive Data Dissemination Through Vehicle Mobility in Smart Cities

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**Abstract :** One of the main challenges of operating a smart city (SC) is collecting the massive data generated from multiple data sources (DS) and to transmit them to the control units (CU) for further data processing and analysis. These ever-increasing data demands require not only more and more capacity of the transmission channels but also results in resource over-provision to meet the resilience requirements, thus the unavoidable waste because of the data fluctuations throughout the day. In addition, the high energy consumption (EC) and carbon discharges from these data transmissions posing serious issues to the environment we live in. Therefore, to overcome the issues of intensive EC and carbon emissions (CE) of massive data dissemination in Smart Cities, we propose an energy efficient and carbon reduction approach by utilizing the daily mobility of the existing vehicles as an alternative communications channel to accommodate the data dissemination in smart cities. To illustrate the effectiveness and efficiency of our approach, we take the Auckland City in New Zealand as an example, assuming massive data generated by various sources geographically scattered throughout the Auckland region to the control centres located in city centre. The numerical results show that our proposed approach can provide up to 5 times lower delay as transferring the large volume of data by utilizing the existing daily vehicles' mobility than the conventional transmission network. Moreover, our proposed approach offers about 30% less EC and CE than that of conventional network transmission approach.

**Keywords :** smart city, delay tolerant network, infrastructure offloading, opportunistic network, vehicular mobility, energy consumption, carbon emission

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