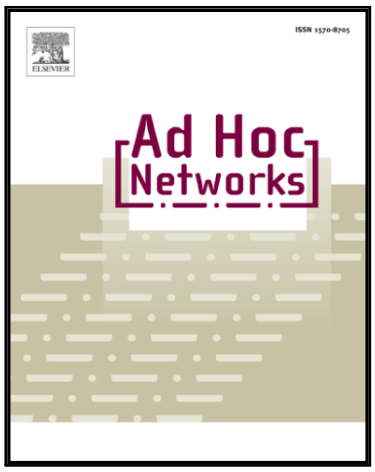

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Design and Analysis of Stochastic Traffic Flow Models for Vehicular Clouds

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Abstract

Intelligent transportation systems (ITS) have attracted an increasing amount of attention within both public and private sectors due to the unprecedented number of vehicles all over the world. ITS aim to provide innovative applications and services relating to traffic management, and enable ease of access to information for various system users. The intent to utilize the excessive on-board resources in the transportation system, along with the latest computing resource management technology in conventional clouds, has cultivated the concept of the Vehicular Cloud. Evolved from Vehicular Networks, the vehicular cloud can be formed by vehicles autonomously, and provides a large number of applications and services that can benefit the entire transportation system, as well as drivers, passengers, and pedestrians. However, due to high traffic mobility, the vehicular cloud is built on dynamic physical resources; as a result, it experiences several inherent challenges, which increase the complexity of its implementations. Having a detailed picture of the number of vehicles, as well as their time of availability in a given region through a model, works as a critical stepping stone for enabling vehicular clouds, as well as any other system involving vehicles moving over the traffic network. Therefore, in this paper we present a comprehensive stochastic analysis of several traffic characteristics related to the implementation of vehicular cloud inside a road segment by adopting proper traffic models. According to the analytical results, we demonstrate the feasibility of running a certain class of applications or services on the vehicular cloud, even for highly dynamic scenarios.

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