

# A Density-Based RSU Deployment and Optimization Heuristic Method for Vehicular Networks

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**Abstract**—The promising vision and high demands of autonomous driving accelerate the development of vehicular communications. To guarantee the safe operation of vehicles, the wireless access communication network with seamless radio coverage capability is the cornerstone. In this paper, we investigate the network deployment and optimization for vehicular communication networks and propose a density-based heuristic method. We assume that the roadside units (RSU) are deployed on the static public street lamps for equipment cost savings. An optimization problem is formulated to minimize the equipment costs while satisfying the seamless radio coverage condition. To solve the problem, we use a heuristic method and propose a novel density-based algorithm to cope with it. Specifically, we assume an RSU is deployed on a street lamp and make a statistic of the nearby street lamps located within its radio coverage range, which is regarded as the density metric. The higher density is, the higher priority it is chosen. Then, we repeat the above steps until all lamps are covered by RSUs. The simulation results show that our proposal can not only guarantee the seamless radio coverage requirement but also reduce the equipment expenditure significantly, enhancing the safety and reliability of vehicle-to-everything (V2X) wireless communication greatly.

**Keyword**—Vehicular Communications, Network Design, Network Optimization, Heuristic Method, Density-Based Solution



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