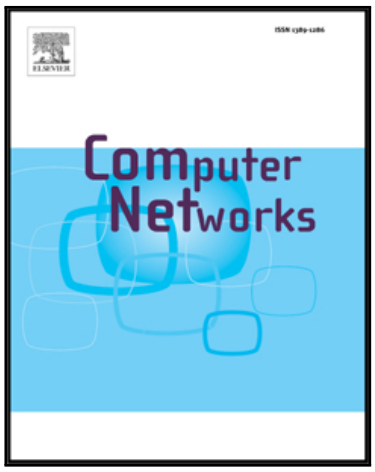

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Cooperative Sensing for Improved Traffic Efficiency: the Highway Field Trial

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Abstract

The existing architecture of Information and Communications Technology (ICT) supporting Intelligent Transportation Systems (ITSs) exhibits a hierarchical nature where the data is flowing from bottom (vehicles, sensors, road side units, etc.) to top (centralized management system) and, once processed, back to the bottom layer (variable message signs, emergency services, etc.). However, this centralized approach limits the inclusion of new devices and exhibits latency and security issues. These issues are tackled by Intelligent Cooperative Sensing for Improved traffic efficiency (ICSI), a European Union funded project which proposes an architecture where the intelligence for sensing and actuation is distributed and exhibits high reliability by incorporating local replication, high scalability by easily accommodating new components and bounded latency by significant shorter paths. In this paper, we present the proposed architecture, the developed road side unit (RSU), on board unit (OBU), and software modules appropriate for the cooperative operations and for achieving the goals envisioned in the ICSI project. The developed prototypes are integrated into an end-to-end demonstrator and used in on-field experiments for the use cases of smart urban traffic management accident recovery on the highways. The generated trial results validate the effectiveness of the proposed strategies, together with the operations of the distributed architecture and provide a set of advanced tools for control, monitoring, simulation and predictions, that achieves a more safe, sustainable and uncongested road.

Keywords: ICSI, Cooperative Sensing, Traffic Efficiency, Highways, Field Trials, Vehicular Communications.

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