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Special Issue of IEEE Transactions on Vehicular Technology on Vehicle Connectivity and Automation using 5G Networks

Autonomous vehicles require new approaches for vehicle-to-everything (V2X) communications to access data and location information. The fifth-generation (5G) networks emerge as a key provider for the stringent connectivity requirements that enable autonomous vehicles to operate safely without any tolerance of service interruptions. Some of the key advantages of 5G networks are deploying ultra-dense small cells and the massive multiple-input multiple-output technology, which allow the connectivity of vehicles all time at any location. This networking system requires high computational power that can process information received from vehicles about their routes and status, to provide feedback messages with minimum delays. In addition, multi-connectivity to autonomous vehicles requires a precise time alignment to maintain online live transmissions. The collected data will not only be used for navigation but also to divert vehicles between charging stations, by employing machine learning-based tools and protocols. The cloud backbone and network functions support massive data processing and storage by employing different connection models to relay data between vehicles and relevant data providers. Relying on peripheral sensors, these technologies communicate all objects locations to vehicles and inform them how to react using the 5G network supporting features.

Cellular-V2X (C-V2X) is one of the next-generation technologies that improve safety consciousness and provide automated driving solutions. This facilitates a direct communication mode between the cars using the 5.9 GHz band. Although 3GPP defined the LTE V2X in Release 14, there is still a big gap in identifying the multi-connectivity mode in non-cellular scenarios and the supporting radio technologies that aggregate such connections at the radio access segment. There is also a strong need to analyze the validity of incorporating C-V2X along with V2X communications to relay packets to vehicles in shadow areas lacking enough accessibility to service providers. In addition, power consumption and the control of power storage at automated vehicles is another area of research that combines the electric charges and chosen route for central prediction of vehicles status changes.

This special issue, inspired by the recent advances and trails in C-V2X using 5G networks, envisions contributions including different C-V2X aspects ranging from the physical radio interface, including signal processing techniques and medium access control (MAC) design, to the networking protocols. It will bring together academic and industrial researchers to identify and discuss technical challenges and recent results related to V2X communications. Specific topics include, but are not limited to:

- Vehicle-to-vehicle and vehicle-to-infrastructure communications;
- Vehicle-to-Internet communications, radio access network and core network supporting technologies;
- Physical layer: interference mitigation, propagation models, and others;
- Protocols for vehicular networks (MAC/link layer, routing, IP mobility, transport, applications), and performance enhancements;
- New trends in VANETs and vehicle data exchanges;
- Data dissemination, processing, and storage in vehicle-cloud networks;
- Mobility management, network management, traffic modeling and optimization;
- Route optimization and route change metrics;

- Cooperative ITS solutions, traveler information services and multi-modal transport;
- Analytical, simulation, and experimental systems;
- Recent standardization efforts and problems (e.g., 3GPP, ITS, IEEE);
- Network stability, scalability and optimization;
- Integration of various platforms onto a single network.

Submission Guidelines:

Authors should follow the guidelines from the “Information for Authors” of the IEEE Transactions on Vehicular Technology (<http://www.it.is.tohoku.ac.jp/~tvt/>).

Prospective authors should submit a PDF version of their complete manuscript via the Manuscript Central, at <http://mc.manuscriptcentral.com/tvt---ieee>.

Note: Papers outside the scope of Vehicular Communications will not be accepted for submission.

Important Dates:

- **Manuscript Submission:** December 1, 2018
- **First Round Decision:** March 1, 2019
- **Revised Paper Submission:** April 15, 2019
- **Final Editorial Decision:** June 1, 2019
- **Final Manuscript Due:** June 20, 2019
- **Publication Date:** Third Quarter 2019

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