

Advanced and Applications in Vehicular Ad Hoc Networks

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Recently there is a strong interest in developing networking techniques and important applications for moving vehicles, to enable wireless communication between roadside and vehicles or between vehicles. Vehicular ad hoc networks (VANETs) using all kinds of wireless technologies has recently received considerable attention. The goal of this special issue is to explore the development of wireless vehicular ad hoc network technologies about communication, networking, and applications.

The communication protocol design will affect the performance results. A good communication protocol design can achieve highly reliable, highly scalable, and high performance. In aspect of networking, there are many challenges that how to offer quality of service, build high performance routing, provide mobility management, and create secure vehicular ad hoc networks. VANET safety applications include safety warnings and collision avoidance. It is important to improve the non-safety applications and reduce the occurrence of collision. VANETs present a highly active field of research, development, standardization and field trials. Throughout the world, there are many national/international projects from government, industry, and academia devoted to VANETs, for example consortia like

VSC (US), C2CCC (Europe) and InternetITS (Japan), standardization efforts like IEEE 802.11p (WAVE) and field trials like the large-scale Vehicle Infrastructure Integration Program (VII) in the US.

The call for papers for this Special Issue attracted more than 50 submissions from Asia, Europe, and the US covering many topics this Special Issue focuses on. Each paper was carefully evaluated by at least two reviewers. Based on the review results, we selected 13 high quality research papers to be included in this Special Issue. We strongly believe that the selected papers will make a significant contribution to researchers, practitioners, and students working in the area of the VANET.

Our special thanks go to Dr. Imrich Chlamtac (Editor-in-Chief) and Katuscia Buonomano for their valuable support throughout the preparation of this Special Issue. We would like to thank all authors who have submitted papers to the Special Issue and in particular those whose papers have been accepted for this Special issue. Assistance from the editorial staff of the Mobile Networks and Applications journal is also very much appreciated. Finally, the Guest Editors wish to gratefully acknowledge all those who have generously given their time to review the papers submitted for consideration for this SI.

The thirteen accepted papers are divided into three categories. Two papers relate to channel modeling or access. “Channel Modeling and Inter-Carrier Interference Analysis for V2V Communication Systems in Frequency-Dispersive Channels” by Hsiao-Hwa Chen et al. presents a practical model to characterize V2V communication channel and its corresponding Doppler spread spectrum is derived. “Cooperative and Opportunistic Channel Access for Vehicle to Roadside (V2R) Communications” by Wanjiun Liao et al. proposes a new mechanism called Proxy-based Vehicle to exploit cooperative and opportunistic forwarding between any

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two distant roadside units (RSUs) and to emulate back-to-back transmissions within the coverage of an RSU.

Five papers are relative to routing and scheduling. “A Mobicast Routing Protocol in Vehicular Ad-Hoc Networks” by Yuh-Shyan Chen et al. proposes a spatiotemporal multicast, called a “mobicast”, protocol for supporting applications which require spatiotemporal coordination in vehicular ad hoc networks (VANETs). “ACAR: Adaptive Connectivity Aware Routing for Vehicular Ad Hoc Networks in City Scenarios” by Qing Yang et al. proposes an adaptive connectivity aware routing (ACAR) protocol that addresses these problems by adaptively selecting an optimal route with the best network transmission quality based on statistical and real-time density data that are gathered through an on-the-fly density collection process. “GeoDTN + Nav: Geographic DTN Routing with Navigator Prediction for Urban Vehicular Environments” by Kevin Lee et al. proposes GeoDTN + Nav, a hybrid geographic routing solution enhancing the standard greedy and recovery modes exploiting the vehicular mobility and on-board vehicular navigation systems to efficiently deliver packets even in partitioned networks. “Service Scheduling of Vehicle-Roadside Data Access” by Yang Zhang et al. presents a scheduling scheme called D*S to consider both request deadline and data size under vehicle-roadside data access. Author also proposes a D*S/N scheme to address wireless broadcasting scenario and a two-step scheme which is adaptive to different workload scenarios. “Delay Optimal Scheduling in a Two-Hop Vehicular Relay Network” by Venkatesh Ramaian et al. studies a scheduling problem in a wireless network where vehicles are used as store-and-forward relays, a situation that might arise, for example, in practical rural communication networks.

The last six papers are about mobility management, sensor framework and location update or privacy issues. “A Novel Mobility Management Scheme for Integration of Vehicular Ad Hoc Networks and Fixed IP Networks” by Yanlin Peng et al. proposes a novel mobility management scheme to manages mobility of vehicles based on street layout as well as the distance between vehicles and base stations. “A Resilient and Scalable Flocking Scheme in Autonomous Vehicular Networks” by Naixue Xiong et al. proposes a resilient and scalable flocking scheme for a group of vehicles, which follows the leader-followers moving pattern. “A Framework for Pervasive Applications applied to Intra-Vehicular Sensor Network Applications” by Jong Hyuk Park et al. presents a Framework for Pervasive

Applications and describes how it can be customized in the case of Vehicular Applications. The framework consists of a set of software requirements, some metrics, and some middleware services for rapid prototyping pervasive applications. “WiMAX Location Update for Vehicle Applications” by Yi-Bing Lin et al. presents an analytic model to study the performance of the location update with/without APC relocation. “Wireless Location Privacy Protection in Vehicular Ad-Hoc Networks” by Vincent W.S. Wong et al. proposes a vehicle density-based location privacy (DLP) scheme which can provide location privacy by utilizing the neighboring vehicle density as a threshold to change the pseudonyms. “REP: Location Privacy for VANETs Using Random Encryption Periods” by Albert Wasef et al. proposes propose a novel location privacy preservation scheme for VANETs using random encryption periods (REP). REP is based on a privacy preserving group communication protocol, which has a conditional full statelessness property.



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