Vehicular Communications 4 (2016) 38

Contents lists available at ScienceDirect

Vehicular Communications

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Guest Editorial "Vehicular Cloud Networking"

Vehicular ad-hoc networks have gained a significant attention during the last decades from the industry and academia with the goals of increasing road safety and traffic management among others. However, vehicles are normally constrained by resources, including computation, storage, and radio spectrum bandwidth. Many emerging applications demand complex computation and large storage, including in-vehicle multimedia entertainment, vehicular social networking, etc. It becomes increasingly difficult for an individual vehicle to efficiently support these applications.

A promising solution is to share the computation and storage resources among all vehicles or physically nearby vehicles. As such, a new paradigm has emerged called "Vehicular Clouds" and consist of a group of vehicles whose collective computing, sensing, communication and physical resources can be coordinated and dynamically allocated to authorized users.

The goal of this special issue is to study this emerging paradigm of cloud-based vehicular networks. This topic being relatively new, we have received only six papers. After extensive review and discussion, two papers were selected for publication, providing insights into recent research outcomes and hopefully directions for more prolific research on vehicular clouds.

In "Virtual Machine Migration and Management for Vehicular Clouds", Refaat et al. [1], consider that vehicles may be virtual machine hosts and consequently need to exchange their workload to maintain the availability of data within the vehicular based data center. Four virtual machine migration, algorithms that take into consideration, on one hand, the dynamicity and mobility of vehicles and, on the other hand, their workload, are proposed. Their performance is evaluated with respect to a set of metrics through simulations with varying levels of vehicular traffic congestion, virtual machine sizes and levels of load restriction.

In "Virtualizing Vehicular Node Resources: Feasibility Study of Virtual Machine Migration", Baron et al. [2] investigate the problem of virtual machine migration in large-scale vehicular networks. The authors propose a centralized architecture to manage and allocate virtual resources (CPU, memory, storage, and on-board sensors) within the vehicular cloud by allowing virtual machine migrations via Vehicle-to-Vehicle communications instead of relying on cellular networks. The migration procedure is not straightforward and relies on the opportunistic contacts between mobile vehicles as a result of network intermittent connectivity. Simulations are conducted on an opportunistic network of buses using real world traces from Dublin city, and show that such a scenario can accommodate transfers of several hundreds of Megabytes, sufficient for virtual machine migrations.

We express our thanks to the authors who submitted papers and to the reviewers for their thoughtful comments. It has been a pleasure to put together an issue, yet a short one, on such a timely topic. We are grateful to the Editor-in-Chief, Mohammed Atiquzzaman, for giving us the opportunity to put together this special issue and for his support throughout the process.

References

[1] T.K. Refaat, B. Kantarci, H. Mouftah, Virtual machine migration and management for vehicular clouds, Veh. Commun. 4 (2016) 47–56 (this issue).

[2] B. Baron, M. Campista, P. Spathis, L.H. Costa, M.D. Amorim, O.C. Duarte, G. Pujolle, Y. Viniotis, Virtualizing vehicular node resources: feasibility study of virtual machine migration, Veh. Commun. 4 (2016) 39–46 (this issue).

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http://dx.doi.org/10.1016/j.vehcom.2016.05.002
2214-2096/