

## WWVC 2014

**Title:** How Effective is Token Passing for Vehicular Safety Communications?

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**Abstract:** Most applications developed for vehicular environments rely on broadcasting as the main mechanism to disseminate their messages. However, in IEEE 802.11p, the most widely accepted MAC protocol for vehicular communications, all transmissions remain unacknowledged if broadcasting is used. Furthermore, safety message transmission requires a strict delay limit and a high reliability, which is an issue for random access MAC protocols like IEEE 802.11p. Therefore, transmission reliability becomes the most important issue for broadcast-based services in vehicular environments.

We investigated how token passing methods improve the IEEE 802.11p performance. A hybrid MAC protocol, referred as Dynamic Token-Based MAC Protocol (DTB-MAC) was proposed. DTB-MAC uses both a token passing mechanism and a random access MAC protocol to prevent channel contention as much as possible, and to improve the reliability of safety message transmissions. Our proposed protocol tries to select the best neighbouring node as the next transmitter in a token rotation fashion, although it can switch back to a random access MAC protocol if particular congestion conditions are met. In order to evaluate the protocol in a realistic vehicular environment, we used Veins to couple OMNeT++ and SUMO, and use R for statistical result analysis. Based on results, including both highway and urban scenarios, we found that DTB-MAC provides better overall performance compared to IEEE 802.11p, even in high network density scenarios.

**Bio:** Ali Balador is currently an *intern* at Halmstad University and a PhD Candidate at the GRC research group, Universitat Politècnica de València, under supervision of Dr. Juan Carlos Cano, and Dr. Carlos Calafate. Also, he was *accepted* to the *internship* program at *NII (National Institute of Informatics)*, Japan. He received his B.Sc. and M.Sc. degrees in computer engineering from Islamic Azad University in 2007 and 2010 respectively. In both cases, he graduated with honors. His research interests include: wireless networks, network simulation, vehicular ad-hoc networks, and MAC layer protocols. He is currently working on his PhD thesis about Design and Evaluation of Efficient Medium Access Control for Vehicular Environments.