

Inter-Vehicular Communication

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Tutorial

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Abstract:

This tutorial covers the most recent progress in Inter-Vehicular Communication. In a first part, we investigate the requirements on IVC ranging from traffic information systems to safety applications with real-time communication constraints. Typical IVC approaches are introduced including fully distributed as well as infrastructure-based, and centralized 3G/4G solutions. Emphasis is laid on the most recent standardization activities in the DSRC/WAVE context. We continue to discuss relevant protocols and communication principles to provide detailed information on which communication methods can be applied and how IVC protocols are developed. We study ad hoc routing approaches and their limitations to cover wide areas as well as recent geo-routing and broadcast-based data dissemination techniques. The main focus, however, will be on recently developed beaconing approaches that can easily be built upon the IEEE 802.11p protocol standard. The second part of the tutorial will focus on Secure IVC. Relying on broadcast transmissions, IVC solutions are exposed to multiple threats. Attacks are not easily prevented because of the ephemeral nature of IVC links and the constant movement of vehicles, as well as by the stringent timing requirements of IVC applications. We discuss the vulnerabilities of IVC solutions in terms of identity management, message authentication/protection/consistency, privacy protection and in-vehicle security. This overview will provide attendees with the state of the art as well as the open challenges in the field of secure IVC.

Speaker Bios:

Falko Dressler is a Full Professor of Computer Science heading the Computer and Communication Systems Group at the Institute of Computer Science, University of Innsbruck. He

teaches on self-organizing sensor and actor networks, network security, and communication systems. Dr. Dressler received his M.Sc. and Ph.D. degree from the Dept. of Computer Science, University of Erlangen in 1998 and 2003, respectively. Dr. Dressler is an Editor for journals such as Elsevier Ad Hoc Networks, ACM/Springer Wireless Networks (WINET), and Elsevier Nano Communication Networks. He was guest editor of special issues on self-organization, vehicular networking, and bio-inspired computing and communication for IEEE Journal on Selected Areas in Communications (JSAC), IEEE Communications Magazine, Elsevier Ad Hoc Networks, and others. Among other, Dr. Dressler wrote the textbooks Self-Organization in Sensor and Actor Networks, published by Wiley in 2007. Dr. Dressler is an IEEE Distinguished Lecturer in the fields of inter-vehicular communication, self-organization, and bio-inspired networking. Dr. Dressler is a Senior Member of the IEEE (COMSOC, CS, VTS) as well as a Senior Member of ACM (SIGMOBILE). His research activities are focused on adaptive wireless networking and self-organization methods addressing issues in wireless ad hoc and sensor networks, inter-vehicular communication systems, bio-inspired networking, and adaptive network security techniques.

Claudio Casetti got his M.Sc. degree in Electrical Engineering from Politecnico di Torino, Italy. He got his PhD in Telecommunication Engineering from the same institution and he is currently an Assistant Professor at Dipartimento di Elettronica. He has published more than 130 papers in peer-refereed international journals and conferences on the following topics: Transport and network protocols in wired networks, IEEE 802.11 WLANs, Vehicular networks, Ad hoc and sensor networks. He holds one patent from the U.S. Patent Office and two from the E.U. Patent Office. He serves in the TPC of the main international conferences in the networking field (e.g., IEEE INFOCOM, IEEE GLOBECOM or IEEE ICC). He was the Workshop Co-Chair of IEEE INFOCOM 2009, the Technical Program Co-Chair of IEEE WONS 2009 and the General Co-Chair of IEEE WONS 2010. He was Principal Investigator in the Alcatel France - Politecnico di Torino research contract on "End-to-end QoS Solutions in wireless networks" (2003-2004). He was principal investigator in the VICSUM project on vehicular networks funded by Regione Piemonte (2007-2009). He has acted as Team Leader for Politecnico di Torino in the FP6 Network of Excellence - NoE "Euro-NGI" (2003-2006), the FP6 NoE "Euro-FGI" (2006-2008) and the FP7 NoE "Euro-NF" (2008-2011). He is a member of IEEE. He has been a visiting scholar at Umass Amherst, UCLA and UCSD.

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