

## WWVC 2013

Abstract:

### ***Supporting Safety at Intersections and in Road Trains: Protocol Engineering for IVC***

In this talk, the need for a new generation of Inter-Vehicle Communication (IVC) protocols will be discussed. With the standardization of the DSRC/WAVE protocol stack, the vehicular networking community converged to a common understanding of data dissemination schemes that already have high potentials for many applications. Yet, vehicular networks are way more dynamic than originally considered. Radio signal fading and shadowing effects need to be considered in the entire design process as well as the strong need for low-latency communication, fairness, and robustness. In the main part of the talk, examples or basic building blocks for such new IVC protocol will be presented. Starting with the Adaptive Traffic Beacon (ATB) approach, which supports the exchange of delay-sensitive traffic information in a wide range of scenarios by flexibly adapting to the availability of infrastructure elements as well as to the network load, we discuss which concepts help designing fully decentralized congestion aware protocols. ATB has been designed to be adaptive in two dimensions: First, the beacon interval is adapted dynamically and, secondly, the protocol can dynamically make use of available infrastructure elements. This concept has been taken over by ETSI standardization. The new approach is called Decentralized Congestion Control (DCC). Putting two application examples into the focus of the discussion, namely intersection warning systems and platooning, we will see that careful congestion control might be counterproductive for hard safety applications. We finish discussion possible ways out based on the new and way more aggressively reacting Dynamic Beacon (DynB) approach. This concept takes into account the dynamics caused though signal shadowing by buildings and other vehicles. The optimization goal is again to make full use of the wireless channel but prevent overload situations, i.e., collisions, reducing the performance of the transmissions.

Bio:

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Falko Dressler is a Full Professor for Computer Science and head of the Computer and Communication Systems Group at the Institute of Computer Science, University of Innsbruck. Dr. Dressler received his M.Sc. and Ph.D. degrees from the Dept. of Computer Science, University of Erlangen in 1998 and 2003, respectively. Before moving to Innsbruck, he has been an Assistant Professor with the Computer Networks and Communication Systems chair at the Department of Computer Science, University of Erlangen, coordinating the Autonomic Networking group. He is an Editor for journals such as *IEEE Trans. on Mobile Computing*, *Elsevier Ad Hoc Networks*, *ACM/Springer Wireless Networks (WINET)*, and *Elsevier Nano Communication Networks*. He was Guest Editor of special issues on self-organization, autonomic networking, and bio-inspired communication for *IEEE Journal on Selected Areas in Communications (JSAC)*, *Elsevier Ad Hoc Networks*, and others. Dr. Dressler was General Chair of IEEE/ACM BIONETICS 2007 and IEEE/IFIP WONS 2011, TPC Co-Chair for IEEE VNC, IEEE VTC, and IEEE GLOBECOM, Area TPC Chair for IEEE INFOCOM, and Poster/Demo Chair for ACM MobiCom. He regularly serves in the TPC of networking conferences such as IEEE INFOCOM, IEEE ICC, IEEE GLOBECOM, and IEEE WCNC. Among others, Dr. Dressler wrote the textbook *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 and nano-networking. Dr. Dressler is a Senior Member of the IEEE (COMSOC, CS, VTS) as well as a Senior Member of ACM (SIGMOBILE), and member of GI (KuVS). He is actively participating in the IETF standardization. His research activities are focused on adaptive wireless networking and self-organization methods with applications in wireless ad hoc and sensor networks, inter-vehicular communication, bio-inspired and nano-networking, and network security.