

Preface

With the advent of the intelligent transport system (ITS), vehicular communications networks have been widely studied in recent years. Dedicated short-range communications (DSRC) can provide efficient real-time information exchange between vehicles even with the lack of pervasive roadside communications infrastructure. Although mobile cellular networks are capable of providing great coverage for vehicular users, the requirement of stringent real-time safety services cannot always be guaranteed in mobile networks. Therefore, the Heterogeneous Vehicular NETwork (HetVNET), which integrates cellular networks with DSRC, emerges as a promising solution to meet the communications requirements of the ITS. Although there exist extensive reported studies on either DSRC or cellular networks, the combination of these two popular techniques remains a relatively nascent field of research. Building such HetVNETs requires thorough investigations into heterogeneity and its associated challenges.

The objective of this monograph is to present architectures of the HetVNET and to examine recent advances in Medium access control (MAC) layer designs for such systems. In Chap. 1, we present the motivation to the development of HetVNETs after a brief introduction to existing vehicular networks as well as the user cases and requirements of ITS services. Chapter 2 proposes an HetVNET architecture that utilizes a variety of wireless networking techniques, followed by the descriptions of various applications in some typical scenarios. Chapter 3 focuses on the MAC mechanisms of vehicular communications including a novel location-based channel congestion control mechanism. In order to well exploit the radio resources in HetVNETs, efficient resource allocation schemes are desired. Thus, not only the content-based scheme but also the cooperative one are presented in Chap. 4, following a short brief to the state-of-the-art. Finally, Chap. 5 suggests some open issues that help point out new research directions in HetVNETs.

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