

Preface

Vehicular ad hoc networks (VANETs) are a special kind of communication networks, where vehicles communicate with each other and with stationary road side units (RSUs). VANETs are expected to support a large spectrum of mobile distributed applications that range from road safety applications to on-board infotainment applications. As communication nodes (vehicles or RSUs) are organized in an ad hoc manner to form a communication network, VANETs possess some special characteristics, such as the highly dynamic network topology (with high node mobility and frequent link breakage) and stringent quality of service requirement (for high priority delay sensitive safety messages), as compared with the general mobile ad hoc networks (MANETs). Hence, directly applying the existing communication protocols designed for MANETs may not be reliable and efficient in VANETs. Thus, investigation and development of VANET communication protocols are required to support the wide range of applications.

The objective of this book is to study three fundamental issues related to link-layer cooperation in VANETs: (1) how to utilize the available radio resources efficiently for more reliable transmission in the existing distributed TDMA¹ (D-TDMA) medium access control (MAC) protocols, (2) how to customize node cooperation mechanism such that it does not interfere with any D-TDMA operations, and (3) how to support safety-related applications which use broadcast services. Further, we present link-layer cooperative frameworks addressing these fundamental issues to improve communication quality in VANETs. We evaluate the performance of the proposed cooperation schemes with computer simulations and mathematical analysis in terms of throughput and transmission reliability. The proposed node cooperation frameworks enhance the performance of D-TDMA

¹Time Division Multiple Access.

MAC, making it more robust to tackle dynamic networking conditions in VANETs and more suitable to support the wide range of applications and their strict service requirements.

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