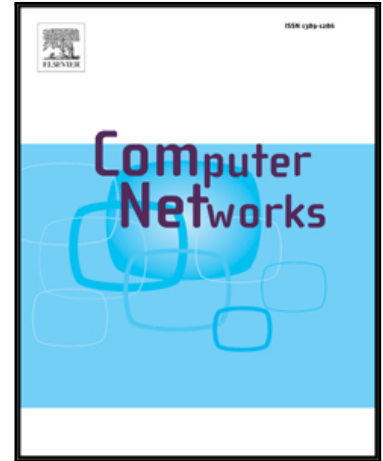


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## Review Article

# Prediction-based Protocols for Vehicular Ad Hoc Networks: Survey and Taxonomy

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## ABSTRACT

The high mobility of vehicles as a major characteristic of Vehicular Ad Hoc Networks (VANETs) affects vividly the dynamic nature of the networks and results in additional overhead in terms of extra messages and time delay. The future movements of the vehicles are usually predictable. The predictability of the vehicles future movements is a result of the traffic conditions, the urban layout, and the driving requirements to observe the traffic constrains. Hence, predicting these future movements could play a considerable role for both building reliable vehicular communication protocols and solving several issues of intelligent transportation systems. In the literature, numerous prediction-based protocols are presented for VANETs. Therefore, this paper follows the guidelines of systematic literature reviews to provide a premier and unbiased survey of the existing prediction-based protocols and develop novel taxonomies of those protocols based on their main prediction applications and objectives. A discussion on each category of both taxonomies is presented, with a focus on the requirements, constrains, and challenges. Moreover, usage analysis and performance comparisons are investigated in order to derive the suitability of each prediction objective to the various applications. Also, the relevant challenges and open research areas are identified to guide the potential new directions of prediction-based research in VANETs. Throughout this paper, information is provided to developers and researchers to grasp the major contributions and challenges of the predictive protocols in order to pave the way for enhancing their reliability and robustness in VANETs.

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## 1. Introduction

Vehicular Ad Hoc Networks (VANETs) is a subclass of Mobile Ad Hoc Networks (MANETs) and the general characteristics of VANETs are typically inherited from MANETs in terms of lack of infrastructure, self-management and shared transmission media [1]. However, VANETs exhibit plenty of unique characteristics and operate in a challenging communications environment, which create diverse considerable challenges to develop efficient vehicular communication protocols [2]. For instance, the high speed of the vehicles and the large scale of the network lead to dynamic topology.

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