

Abstract

Collaborative traffic-monitoring (CTM) systems exploit the location information continuously collected from vehicles. Location data are very sensitive information that made privacy a major obstacle for the widespread usage of CTM systems. The way how this data are generated and used is very important for users' privacy and data quality as well. Recently, two CTM approaches have been proposed, the first relies on a dedicated infrastructure that is called vehicular *ad hoc* networks (VANETs), and the second utilises the existing underlying infrastructure such as cellular and wireless networks. In this study, the authors propose a privacy aware collaborative traffic monitoring system (PA-CTM) that considers the privacy and security properties of VANETs and existing infrastructures. PA-CTM provides a client server architecture that relies on existing infrastructures and enhances privacy by: (i) Using a robust pseudonym providing system for anonymous access. Pseudonyms enable users to be authenticated anonymously by the traffic server without having their identities revealed. It also allows revealing identities for law enforcement purposes when necessary. Users are able to change their pseudonyms and hence hide their complete trajectory information from traffic server. (ii) Utilising a novel autonomous location update mechanism (ALUM) that does not rely on a trusted third party and uses only local parameters (speed and direction) for triggering a location update or pseudonym change. These performance results showed that ALUM is effective for traffic monitoring in terms of both privacy and utility.