Abstract

Traffic volume is steadily increasing whilst infrastructure capacities stay the same – based on this prediction efficient processing of floating car data (FCD) and extended floating car data (xFCD) is of great significance to ensure future individual mobility. By taking into consideration results of existing FCD/xFCD studies the major subject of this paper is to define base requirements for collecting (x)FCD in a large scale environment. IM TD, AKTIV and COOPERS are some of the most significant projects in the field of car to infrastructure (C2X), car to car (C2C) and infrastructure to car (X2C) research sector. One focus of this paper is to analyse potential barriers of these approaches referring to a large area application with at least 10,000 xFCD data providers. As we see it an economically feasible solution for a road network wide capturing of floating car data is currently not available. The presented system requirements are the initial approach of processing xFCD in a large scale environment.

1 Introduction

1.1 Floating Car Data and Extended Floating Car Data

The idea of FCD is to collect real-time traffic data by locating the vehicle via GPS or GSM modules. Data such as car position, speed and direction of travel are generally understood as FCD [1]. Extended FCD cover a far wider set of vehicle data from different sources of the car. Depending on year and model the automotive CAN-Bus (controller area networking standard for automotive electronics) processes to a greater or lesser extent vehicle data. Ambient temperature, fog lights, windscreen wipers, switched-on lights, information from ABS and stability control systems are only a few examples of extended floating car data [2].
1.2 Problem Description

Floating Car Data (FCD) and Extended Floating Car Data (xFCD) are countlessly generated by moving vehicles. Extended FCD include a vast amount of data which already exists in millions of vehicles but there are only some research projects like SIM TD, AKTIV or COOPERS which collect and analyse xFCD of a limited number of vehicles and road segments. Extended FCD offer far greater possibilities beyond the detection of traffic situations but the huge potential which lies within hundreds of xFCD parameters cannot be exploited nowadays.

There are several barriers that have to be overcome before xFCD can be processed in a large scale environment. This analysis aims to summarize the difficulties arising from the above mentioned research projects and attempts to set base requirements for processing xFCD in a large scale testbed with 10,000 participants and above.

1.3 Related Projects

SIM TD, AKTIV and COOPERS are some of the most significant projects in the field of car to infrastructure (C2X), car to car (C2C) and infrastructure to car (X2C) research sector. The following consideration is not focused on evaluating achieved results of these well known projects, the main purpose is to analyse the potential barriers of these approaches within a large area application with at least 10,000 xFCD data providers.

SIM TD (Safe and Intelligent Mobility Testfield Germany) is set up as an operational test field for C2X communication. Various applications and services in the areas of road safety and traffic efficiency are/will be tested. The project comprises 400 sensor vehicles and 100 road side units (RSU). Beginning in 2008 and ending in 2011 the project is budgeted with approximately 69 Million Euros [3]. Breaking down overall costs to costs per vehicle results in 172,500 Euro per sensor vehicle. In case of SIM TD road side units are essential for wireless data transfer C2X and X2C. In context of implementing an xFCD system all over the road network the need of road side units is a major barrier for an extensive vehicle sensor network.

AKTIV (adaptive and cooperative technologies for intelligent traffic) is a German research initiative of automobile manufacturers and suppliers, electronics, telecommunication and software companies as well as research institutes. The main goals are to make traffic safer and more fluid with efficient C2C and C2X communication [4]. Beginning in 2006 until mid 2010 the project was budgeted with approximately 18.6 million Euros. On a road length of 15