Abstract

An experimental path loss characterization of the propagation channel in vehicular environments is performed in this PhD Dissertation. This characterization is based on an extensive narrowband channel measurementcampaign. The measurements have been carried out in typical expected vehicular-to-vehicular (V2V) and vehicle-to-infrastructure (V2I) communications environments, i.e., urban, suburban, rural and highway scenarios, for different road traffic densities, vehicles speed and propagation conditions.

The channel sounder used in the measurement campaign has been designed and implemented for the purpose of performing a narrowband characterization, allowing us to analyze both the path loss and fading statistics due to multipath propagation. The measurements were performed in the dedicated short-range communications (DSRC) band at 5.9 GHz. This band has been allocated in USA and Europe for the deployment of safety applications under the intelligent transportation system (ITS) concept. Also, we have performed simultaneously measurement at 700 MHz, which is the frequency band allocated recently by Japan for ITS applications. To the best of the author's knowledge, the results derived in this PhD Dissertation are the first in this opening band.

Different methods have been proposed for analyzing the measurements, allowing us an extensive analysis and study of the path loss for V2V and V2I propagation channels. A linear relationship between the path loss and the transmitter-receiver separation distance has been proposed. This is a simple model, but accurate, that permits us an easy implementation in vehicular networks simulators. Unlike previous works, where only mean values of the path loss models have been reported, the validity range of the model parameters has been analyzed in this PhD Dissertation. In this research, the impact of the propagation conditions, related to line-of-sight (LOS) and non-LOS (NLOS), over the path loss model parameters has been investigated. The differences observed between LOS and NLOS suggest consider the propagation conditions to improve the path loss characterization.

This PhD Dissertation contributes to a better understanding of the path loss propagation in vehicular channels. Therefore, the re-

sults derived here can be used to design and evaluate communications protocols and system architectures for the future vehicular networks, taking into account more realistic propagation conditions.