On 20 MHz Channel Spacing for V2X Communication based on 802.11 OFDM

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Abstract:

In this semi-tutorial paper, we will examine the use of a larger channel spacing than 10 MHz for vehicle-to-vehicle (V2V) and vehicle-to-infrastructure (V2I) communication, collectively referred to as V2X communication, based on the IEEE 802.11 OFDM physical layer. The main advantage of shifting to 20 MHz channel spacing is reduced congestion, which will reduce, or even eliminate, the need for congestion control algorithms. The tutorial parts of the paper will review basic OFDM design rules, summarize the reported values of important V2X channel properties (path-loss, delay spread, Doppler spread), and explain the current frequency allocation in Europe and the US. The novel parts of the paper will verify that the OFDM design rules are satisfied and quantify the performance of 10-MHz and 20-MHz systems through computer simulations. It is shown that a 20-MHz system will outperform a 10-MHz system.