

Virtual Drive for Mobile Radio Systems and Radar Sensors

Thomas Zwick

University of Karlsruhe (TH), Institut für Hochfrequenztechnik und Elektronik,
Kaiserstrasse 12, 76131, Germany, +49-721-6082522; Thomas.zwick@kit.edu

Mobile automotive communication, including broadcast, is one of the fastest growing areas in communications. Mobile phone, Wireless LAN, data transfer, radio, TV and many other candidates require the installation of numerous antennas on the vehicles. To overcome the fading, most services require multiple antennas for Diversity or MIMO operation, which multiplies the number of antennas by a factor of 2 to 4. For the design, placement and test of these antennas especially to identify optimal multi-antenna configurations an enormous effort in man power, time and cost is required since up to now the only viable way are extensive measurement campaigns. The solution to overcome this is *Virtual Drive*.

The automotive market is also ready for the equipment of cars of all types with AntiCollisionControl Radars (ACC) i.e. LongRangeRadars (LRR) and ShortRangeRadars (SRR). The history of these Radars reaches already 50 years back. Only in the last 5 years significant breakthroughs have been reached because of the advancement of semiconductor and processor technologies which led to the first products and allows to expect a rapidly increasing market penetration of such systems in the near future. Presently the installations in cars are tested and optimized by roadside driving, a time and money consuming adventure with bad reproducibility. The solution to overcome this is *Virtual Drive*.

The idea of *Virtual Drive* is very simple and intends to model the system electromagnetically. This procedure has the following steps:

- Modeling of the complex, vehicle integrated antennas
- Modeling of the traffic environment were to drive the vehicle for a certain time period
- Modeling of the multipath wave propagation in the traffic scenario in time steps for the time period
- Apply the results to the signal processing to evaluate the system

In the presentation an overview over anticipated systems is given followed by a description of the methodology and performance of *Virtual Drive*. Based on examples the usage of *Virtual Drive* is demonstrated.