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Analysis of IEEE 802.11 MIMO Radio Links in Vehicular Environments.

ABSTRACT - Masterthesis

Modern vehicles exploit the Wireless Local Area Network (WLAN) technology for in-vehicle multi-media applications and connection of the vehicle to the external devices for software updates. Update packages can include large quantities of data and therefore require fast connections to make the software updates happen at a faster rate. Car manufacturers can use multiple antennas to enable MIMO transmissions with spatial multiplexing and increase the throughput but benefits of increase in the number of antennas depend on the antenna positions and the environment. Outdoor channels can especially be incapable of spatial multiplexing due to strongly correlated paths. Therefore, an extensive analysis of the channel features affecting the MIMO WLAN performance is performed.

A analysis tool based on WLAN chipset hardware had developed for the detailed analysis of IEEE 802.11 radio links in vehicular environments. This tool enables the evaluation of Multiple Input Multiple Output (MIMO) wireless channel based on Channel State Information (CSI) and Received Signal Strength Indicator (RSSI) measurements. The various WLAN measurements were performed in both indoor and outdoor environments for the explicit analysis. An algorithm developed in MATLAB to estimate the WLAN throughput from channel measurements and its implementation as channel evaluation tool.