

The performance of antennas operating from a vehicle environment

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With the increased use of paging devices, personal communications and tracking beacons, there has arisen a need to understand the performance of such systems when operating from a vehicle environment. Ideally, these systems would use an externally mounted antenna when operated from within the vehicle. For body devices, however, this can be extremely inconvenient due to the need to disconnect whenever the user has to leave the vehicle. This leads to the question of how well an antenna can radiate from within a vehicle and to the whereabouts of the best operating positions. For situations that allow use of an external antenna, the question arises as to the performance of the antenna at different locations on the vehicle body and to the whereabouts of the optimum location. At the high frequencies used in the above applications (above 200MHz) the modelling can be extremely complex due to the large amount of structure that has dimension of the order of a wavelength. The current paper describes an attempt to use a wire grid vehicle model to address the above questions. It describes the development of suitable electromagnetic modelling tools and presents the results of a range of simulations for antennas located both within and without the vehicle structure. The results show that the placement of the antenna is critical to an effective outcome and result in some useful guidelines for choosing good operating positions.