

Virtual MIMO Benefit Analysis in a Shared Vehicular Environment

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Abstract:

MIMO (Multiple-Input Multiple-Output) uses multiple antennas at both the transmitter and the receiver as a way of enhancing wireless performance without the need for extra transmitting power. MIMO signal processing can be used to exploit multipath signals, thus enhancing capacity and robustness of the network. Virtual MIMO is formed using two conventional users which collaborate with each other to reduce hardware complexity (number of antennas per user device), and to overcome one of the limitations of classical MIMO. Virtual MIMO can improve capacity, and reduce costs of future wireless systems through reduced hardware complexity and improved coverage.

In this paper, a 4x4 Virtual MIMO scenario is created using the real channel data which was collected by the University of Bristol for a classical MIMO deployment. Multiple vehicular based Virtual MIMO channels are formed by selecting two sets of two antennas for 10 different driving routes locations around the city of Bristol. Capacity and K-factor are two parameters which are evaluated and analysed to compare and contrast Virtual MIMO with classical MIMO. One of the most significant findings is that deploying Virtual MIMO gives 16% improvement in capacity and 33% improvement in K-factor, as compared to two classical MIMO systems.