

Comparison of Wireless Channels for Antenna Tilt based Coverage and Capacity Optimization

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Abstract—Radio coverage and capacity optimization is an important challenge for mobile network operators in deploying future generations of cellular networks. One key factor influencing the coverage in mobile networks is related to the configuration of antennas and especially the antenna tilt setting. The power of the received useful signal in a cell can be increased with proper antenna tilt, causing a significant improvement in signal-to-interference-plus-noise ratio (SINR) which also leads to reduction of interference towards other cells. Dynamic antenna tilt optimization is even more important for the next fifth generation (5G) of wireless communications especially in ultra-dense scenarios for the provision of sufficient coverage and quality of service (QoS). In this work, the effect of wireless channel model selection for the goal of self-optimization of the base station (BS) antenna electrical tilt is investigated. A comparative analysis of the application of different propagation models is performed using an existing method for dynamic and adaptive tilt adjustment based on reinforcement learning (RL) methodology. Simulation experiments considering a cellular network with multiple cells in an urban scenario with randomly distributed users have been carried out and the achieved results show that the careful choice of channel model and related parameters is crucial for the antenna tilt self-optimization process.

Index Terms—Antenna tilt, Cellular Networks, Channel models, Coverage optimization, Mobile Networks, Ultra-Dense Networks