Macro-cell and Pico-cell Propagation in Heterogeneous LTE Networks using Measured Antenna Patterns and Handset Rotation

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Abstract:

This paper studies the impact of antenna pattern and user handset random orientation on macro-cell and pico-cell propagation in heterogeneous LTE networks. The analysis combines measured 3D radiation patterns of basestations and handset antennas with state-of-the-art 3D ray-tracing for a large number of macro-cell and pico-cell basestations and user locations/orientations in an urban environment. Macro and pico propagation characteristics are presented as cumulative distribution functions of the received signal strength, the K-f actor, the RMS delay spread and the RMS angle-of-departure and angle-of-arrival azimuth and elevation spreads. It is shown that using measured antenna patterns and considering the random user handset orientation has significant impact on the propagation characteristics of a heterogeneous LTE network.