Path loss Models for LTE-Advanced Urban Relaying Systems with Antenna Height Correction Factor

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Abstract:

Relaying technology is a key technical enhancement in 3GPP LTE-Advanced developed in order to improve the throughput for cell-edge users. Power-balanced path loss models for links Base Station–Relay Station (BS-RS), Base Station–Mobile Station (BS-MS) and Relay Station–Mobile Station (RS-MS) are required to evaluate relaying system performances. This paper presents a measurement-based study which aims to propose a unified Path Loss (PL) model for links BS-RS and BS-MS. The analysis results demonstrate that the PL exponent is independent from the relay antenna height. The PL decrease with increase in relay antenna height is modeled by an additional parameter called Antenna Height Correc tion Factor (AHCF). AHCF may be added to usual PL models at street level such as the Winner C2 or ITU UMa model. A linear increase of 0.9 m/dB is proposed for modeling AHCF. The paper also analyzes the impact of relay antenna height on shadowing. The shadowing standard deviation does not vary when changing the relay antenna channel models. Furthermore, the shadowing values at different antenna heights are highly correlated with correlation coefficients around 0.8.