

A SIMULATION MODEL FOR DIFFERENT COMPLEX WALL
STRUCTURES IN SUBWAYS OF URBAN MICROCELLS AT
MILLIMETER WAVE FREQUENCY 35GHZ

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A new simulation approach is used to examine wide estimation of signal coverage and other important factors in urban subway environments. In this model a simple computer simulation technique is used to observe effects of different complex wall structures and different surface materials. It is observed that the structure, roughness and material of a wall impart a major role in predictions at the receiver. The direct ray, the ground reflected ray, the multiple wall reflected ray, and the diffracted-multiple reflected ray component effects are simulated to achieve more practical situation predictions in subway environments(F.M.Pallars, F. J. Ponce Juan, Analysis of Path Loss and Delay Spread at 900 MHz and 2.1 GHz While Entering Tunnels, IEEE Transactions on Vehicular Technology, Vol.50,No.3,May 2001.). This study is emphasized on how the power delay profile, peak rms delay spread, fast and slow fading envelopes, and the slope of loss curves for power law calculations are changed for different wall structures like walls with multiple surface materials, wood, concrete, glass, and tile etc; walls having windows, and doors etc. Results show that a very high decay of signal power with high delay spread occurs near the entrance of subway and as the receiver moves away from the transmitter, the multiple reflected ray component, and the diffracted-multiple reflected ray component acts dominant causes decrease in the delay spread values. The fast fading and slow fading gives a good idea of the specific locations where the signal is highly distorted. The slope of loss curves gives the variation of received signal power law w.r.t the transmitter-receiver separation. Another study is performed to analyse interferece with the another transmitter placed in the microcellular street and a beamwidth optimazation technique as used in(T.Tagataga, and T.Tanaka,"Delay Spread Reduction Effect of Beam Antenna and Adaptively Controlled Beam Facing Access System in Urban Line-of-Sight Street Microcells", IEEE Transaction on Vehicular Technology, Vol.52,No.4, July 2003.) is proposed to reduce the effect of co-channel interference. Although authors do not claim high degree of accurate predictions for all the subway conditions, however the results can be utilized in analysis of specific propagation characteristics.

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2. F - Wave Propagation and Remote Sensing
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