Single- and Double-Directional Channel Model for Antenna-Independent Propagation Modeling — Modeling, Applications and Challenges —

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Abstract
Among the propagation engineers for the mobile and wireless systems, single- and double-directional propagation measurements and modeling in the multipath environments are major concerns for the decade. The directional propagation model is the antenna-independent propagation model so as to evaluate the performance of the antennas in the specific wireless system. Therefore, the model is mainly beneficial to the antenna engineers. By using the directional propagation model, the user can reconstruct the channel response including antennas. The antennas can be designed by the manufacturers even after the standardization of the transmission technology for the performance improvement. However, the performance of the antennas should be evaluated in the context of a specific system. Therefore, the reconstruction of the channel response, which consists of multipath propagation and antennas, is necessary.

This paper presents the applications of measurement-based directional propagation models conducted by the author’s group. The presentation first reviews the concept of directional propagation model. Next, the measurement apparatus and the data processing approach are briefly described. Specific examples of applications, such as dedicated short-range communications (DSRC) in a tunnel, ultra-wideband (UWB) radio in a room, multiple-input multiple-output (MIMO) in a macrocell and in an office, will be presented. Finally, the issues, limitations and challenges of the directional channel measurement and modeling will be summarized.

REFERENCES