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Dense Multipath Component Characteristics in 11GHz-band Indoor Environments

Kentaro Saito ⁽¹⁾, Jun-ichi Takada ⁽¹⁾, Minseok Kim ⁽²⁾

Abstract—In the next-generation mobile communication system, utilization of higher frequency bands above 10 GHz has become a hot research topic because it has the potential to improve network capacity drastically by utilizing the available wideband spectrum. However, in the higher frequency band, in addition to the higher propagation loss, diffuse scatterings of propagation waves affect the multiple-input multiple-output (MIMO) transmission performance more significantly. In this paper, 11 GHz band MIMO channel measurements were conducted in line-of-sight (LoS) indoor environments to clarify the characteristics of diffuse scatterings in the higher frequency band. The frequency, angular, and the polarization domain dense multipath component (DMC) propagation parameters were jointly estimated by using RiMAX-based estimator to deal with the DMC contribution to MIMO channels quantitatively. In the measurements, significant DMCs were observed in all areas. The DMCs had directional and the polarization dependencies as well as frequency dependency. The DMC characteristics were different in each area. The angular spreads of the DMCs tended to increase and their decay factor tended to decrease as the room size decreased owing to the contribution of reverberation waves. For the validation, MIMO channel matrices were reconstructed from the estimated propagation parameters, and the results show that the MIMO transmission performance tended to be underestimated without the DMC contribution. The result is expected to be utilized for the novel MIMO channel model proposal in the higher frequency band that includes the DMC contribution.

Contact:

Kentaro Saito
2-12-1-S6-4 Ookayama, Meguro-ku,
Tokyo, 152-8550
JAPAN
Phone: +81 3 5734 2551
Email: saitouken@ide.titech.ac.jp