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The Delay, Angular and Polarization Characteristics of Geometry-based Clusters in an Indoor Environment at 11 GHz Band

Abstract—This paper presents indoor cluster spread and polarization characteristics taken from an estimated multiple-input multiple-output (MIMO) channel of an in-door hall environment at 11 GHz band. The clusters were estimated by utilizing the authors' proposed geometry-based clustering method in which the single bounce (SB) and double bounce (DB) multipath components (MPCs) and clusters can be distinguished. After that, cluster angular spread, delay spread and cross-polarization ratio (XPR) and co-polarization ratio (CPR) for each type of clusters were calculated and investigated. The results showed that the spreads of DB clusters are larger compared to SB clusters. Moreover, the polarization characteristics comparison between them also showed significant difference due to high power loss in horizontally-polarized wave of the DB clusters. This indicated that, due to the different characteristics of SB and DB clusters, the channel modeling accuracy could be improved by modeling the SB and DB clusters separately. Furthermore, based on the statistical fitting results, it was found that both the cluster delay and angular spreads can be approximately described by the log-normal distribution, as well as the cluster polarization ratio.

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