

On mm-Wave Multi-path Clustering and Channel Modeling

Author(s) - Institution(s):

Carl Gustafson, LUND
Katsuyuki Haneda, Aalto
Shurjeel Wyne, COMSATS
Fredrik Tufvesson, LUND

Corresponding author email: carl.gustafson@eit.lth.se

Corresponding WG group: TWGI

Abstract:

Efficient and realistic mm-wave channel models are of vital importance for the development of novel mm-wave wireless technologies. Though many of the current 60 GHz channel models are based on the useful concept of multi-path clusters, only a limited number of 60 GHz channel measurements have been reported in the literature for this purpose. Therefore, there is still a need for further measurement based analyses of multi-path clustering in the 60 GHz band. This paper presents clustering results for a double-directional 60 GHz MIMO channel model. Based on these results, we derive a model which is validated with measured data. Statistical cluster parameters are evaluated and compared with existing channel models. It is also shown that the cluster angular characteristics are closely related to the room geometry and environment, making it infeasible to model the delay and angular domains independently. We also show that when using ray tracing to model the channel, it is insufficient to only consider walls, ceiling, floor and tables; finer structures such as ceiling lamps, chairs and bookshelves need to be taken into account as well.