Cluster Characterization of 3D MIMO Propagation Channel in an Urban Macrocellular Environment

ABSTRACT

Multidimensional characterization of outdoor urban macrocellular propagation channels is essential for the analysis and design of next-generation (5G and beyond) cellular massive MIMO (Multiple-Input-Multiple-Output) systems. Since most massive MIMO arrays will extend in two or three dimensions, an understanding of three-dimensional (3D) parameters (i.e., azimuth and elevation) of the multipath components (MPCs) is required. This paper presents an extensive measurement campaign for 3D outdoor propagation channels in an urban macrocellular environment. Measurements were performed with a 20 MHz wideband polarimetric MIMO channel sounder centered at 2.53 GHz and MPCs were extracted using RIMAX – an iterative maximum likelihood (ML) algorithm. The physical propagation mechanisms of the observed discrete MPCs are explained in terms of waveguiding, over-the-rooftop propagation, and scattering by far-away objects. MPCs exhibit clustering in the temporal and spatial domains; both intra- and intercluster parameters and their relevant statistics are provided. We also extract diffuse MPCs, show that they can comprise a moderate portion of the overall energy, and provide a statistical characterization.

EXISTING SYSTEM

- In existing system, 3D channel model was developed in using a geometry based stochastic model (GSCM).
- However this was done using a different antenna array structure and not all parameters needed to fully characterize and develop a double-directional polarimetric propagation channel model were provided.

PROPOSED SYSTEM

- In proposed system, 3D propagation channel measurement campaign in an urban macrocellular NLOS environment using an advanced MIMO antenna array setup.
- The HRPE algorithm thatwas used in the work is RIMAX – an iterative maximumlikelihood estimator.
- The DMC, which describes the stochastic part of the propagation channel, is assumed to comprise of a large number of individually weak signal components that cannot be estimated individually as plane waves.

SYSTEM REQUIREMENTS

HARDWARE REQUIREMENTS

- Processor - Intel core i3
- RAM - 2B
- Hard Disk - 20 GB

SOFTWARE REQUIREMENTS

- Operating System : LINUX
- Tool : Network Simulator-2
- Front End : OTCL (Object Oriented Tool Command Language)

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