A Stochastic Geometric Analysis of Device-to-Device Communications Operating over Generalized Fading Channels

ABSTRACT

Device-to-device (D2D) communications are now considered as an integral part of future 5G networks which will enable direct communication between user equipments (UE) and achieve higher throughputs than conventional cellular networks, but with the increased potential for co-channel interference. The physical channels which constitute D2D communications can be expected to be complex in nature, experiencing both line-of-sight (LOS) and non-LOS conditions across closely located D2D pairs. As well as this, given the diverse range of operating environments, they may also be subject to clustering of the scattered multipath contribution, i.e., propagation characteristics which are quite dissimilar to conventional Rayleigh fading environments.

CONT…

To address these challenges, we consider two recently proposed generalized fading models, namely - and -, to characterize the fading behavior in D2D communications. Together, these models encompass many of the most widely utilized fading models in the literature such as Rayleigh, Rice (Nakagami- n), Nakagami-m, Hoyt (Nakagami-q) and One-Sided Gaussian.

Using stochastic geometry, we evaluate the spectral efficiency and outage probability of D2D networks under generalized fading conditions and present new insights into the trade-offs between the reliability, rate, and mode selection. Through numerical evaluations, we also investigate the performance gains of D2D networks and demonstrate their superiority over traditional cellular networks.

EXISTING SYSTEM

Most of the previous works published in this area have relied on systemlevel simulations with a large parameter set , meaning that it is difficult to draw general conclusions. Recently, stochastic geometry has received considerable attention as a useful mathematical tool for interference modeling. Specifically, stochastic geometry treats the locations of the interferer as points distributed according to a spatial point process.

PROPOSED SYSTEM

The signal-to-noiseplus- interference ratio (SINR) distributions for general fading environments require evaluating the sum-products of aggregate interference where several approaches have been proposed to facilitate the derivation, most notably:

1) The conversion method
2) The series representation method
3) The integral transform based approach

Hardware requirements

- Processor - Pentium-IV
- Speed - 1.1 Ghz
- RAM - 256MB(min)
- Hard Disk - 20 GB
- Key Board - Standard Windows Keyboard
- Mouse - Two or Three Button Mouse
- Monitor - SVGA

SOFTWARE REQUIREMENTS

- Tool - Network Simulator-2
- Operating system - LINUX
- Front end - OTCL (Object Oriented Tool Command Language)

REFERENCES

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