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Statistical Modeling of Local Area Fading Channels Based on Triply Stochastic Filtered Marked Poisson Point Processes

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Abstract : Multi path fading noise degrades the performance of cellular communication, most notably in femto- and pico-cells in 3G and 4G systems. When the wireless channel consists of a small number of scattering paths, the statistics of fading noise is not analytically tractable and poses a serious challenge to developing closed canonical forms that can be analysed and used in the design of efficient and optimal receivers. In this context, noise is multiplicative and is referred to as stochastically local fading. In many analytical investigation of multiplicative noise, the exponential or Gamma statistics are invoked. More recent advances by the author of this paper have utilized a Poisson modulated and weighted generalized Laguerre polynomials with controlling parameters and uncorrelated noise assumptions. In this paper, we investigate the statistics of multi-diversity stochastically local area fading channel when the channel consists of randomly distributed Rayleigh and Rician scattering centers with a coherent specular Nakagami-distributed line of sight component and an underlying doubly stochastic Poisson process driven by a lognormal intensity. These combined statistics form a unifying triply stochastic filtered marked Poisson point process model.

Keywords : cellular communication, femto and pico-cells, stochastically local area fading channel, triply stochastic filtered marked Poisson point process
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