Interference Modeling for Cellular Networks under Beamforming Transmission

ABSTRACT

- We propose analytical models for the interference power distribution in a cellular system employing MIMO beamforming in rich and limited scattering environments, which capture non line-of-sight signal propagation in the microwave and mmWave bands, respectively. Two candidate models are considered: the Inverse Gaussian and the Inverse Weibull, both are two-parameter heavy tail distributions.
- We further propose a mixture of these two distributions as a model with three parameters. To estimate the parameters of these distributions, three approaches are used: moment matching, individual distribution maximum likelihood estimation (MLE), and mixture distribution MLE with a designed expectation maximization algorithm.

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- We then introduce simple fitted functions for the mixture model parameters as polynomials of the channel path loss exponent and shadowing variance. To measure the goodness of these models, the information-theoretic metric relative entropy is used to capture the distance from the model distribution to a reference one.
- The interference models are tested against data obtained by simulating a cellular network based on stochastic geometry. The results show that the three-parameter mixture model offers remarkably good fit to simulated interference power. The mixture model is further used to analyze the capacity of a cellular network employing joint transmit and receive beamforming and confirms a

EXISTING SYSTEM

- We argue for the important role that interference characterization plays in evaluating and predicting the network performance in both microwave and mmWave bands.
- Traditionally, mmWave bands are considered for backhaul in cellular systems and for high-volume consumer electronics such as personal area and local area networks, but not for cellular access due to concerns about short-range and non-line-of-sight coverage Issues.

PROPOSED SYSTEM

- In proposed system focus on parameterized distributions with as few parameters as possible to make the model the simplest while having a good fit. We test the goodness of the proposed interference models against simulation of a cellular network based on stochastic geometry.
- We note that testing against actual measurement data is also feasible and is desirable when such data are available.

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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