

# Stochastic Ordering Based Carrier-to-Interference Ratio Analysis for the Shotgun Cellular Systems

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*Abstract* A stochastic ordering based analysis is presented for the carrier-to-interference ratio (CIR) in shotgun cellular systems. The CIR is modeled as a random variable and its distribution is analyzed using stochastic ordering techniques. The analysis shows that the CIR distribution is stochastically ordered with respect to the number of interferers. The results are validated through Monte Carlo simulations. The analysis is extended to the case of multiple users and multiple interferers. The results show that the CIR distribution is stochastically ordered with respect to the number of users and the number of interferers. The analysis is also extended to the case of multiple users and multiple interferers with different power levels. The results show that the CIR distribution is stochastically ordered with respect to the power levels of the users and the interferers. The analysis is also extended to the case of multiple users and multiple interferers with different channel gains. The results show that the CIR distribution is stochastically ordered with respect to the channel gains of the users and the interferers.

and i.i.d. transmission powers can be captured by modifying the BS density as shown in Section IV-D, they are assumed to be 1 for all BSs. The generalization to arbitrary path loss model is given in [2, Section VI], which is also equivalent to modifying the BS density  $\lambda(\cdot)$ . As a result, <sup>c</sup>



