

On the Performance of a Two-Relay Cooperative System in Correlated Lognormal Channels

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Abstract:

A cooperative diversity system with multiple relays where the receiver combines the relayed and direct paths consists a practical and useful tool when the communication channels suffer from fading. This paper presents novel analytical formulas and numerical results on the performance of a cooperative diversity system with two relays in arbitrary positions over correlated lognormal channels. The two relays form a diamond-shaped cooperative system. The Fixed Relaying cooperative protocol and the Time Domain Multiple Access (TDMA/half duplex relay) scheme are considered in the present contribution. The destination receiver combines the multiple versions of the received signal utilizing either the Selection Combining (SC) or the Maximal Ratio Combining (MRC) techniques. The performance of the proposed system is compared with a basic cooperative system with only one relay (triangle-shaped cooperative configuration) and a direct link system, in order to investigate the benefits of cooperation. The proposed expressions for the outage probability can be directly applied to various propagation scenarios where the lognormal distribution is used to describe the large scale fading effects such as, indoor, urban and on body propagation environments. Finally, the impact of the lognormal parameters (including correlation) on the cooperative system performance is investigated through extended numerical results.