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Closed-form expression for the BER performance in cooperative communication systems with MRC over Rayleigh fading channels

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Abstract: In this paper, we consider a generalized non-regenerative (amplify and forward) cooperative wireless communication system with L relay nodes. The Rayleigh fading channel is assumed in both broadcasting and relaying stages and maximal ratio combining (MRC) scheme is assumed to be implemented at the receiver side. We evaluate the bit error rate (BER) performance of L -relay nodes cooperative network under the influence of Rayleigh fading channel. The direct channel link between the source and the destination is assumed to have bad channel conditions, and hence, is neglected in the performance evaluation. The Prony approximation for the Gaussian Q-function is used to approximate the BER of coherent modulation techniques in the additive white Gaussian noise (AWGN) channel. Unlike existing expressions in the literature, the BER expression derived in this paper does not include integral-form terms. Numerical results are presented for the closed-form result, which show a great matching with the exact ones calculated using numerical integrals.