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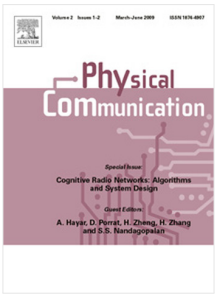

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Secure Wireless Multicasting with Linear Equalization

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Abstract

A confidential communication scenario is considered in which a base station (BS) transmits a common stream of information to a group of users in the presence of multiple eavesdroppers via multiple relays. Multiple relays are used to provide cooperative spatial multiplexing that significantly increases the spectral efficiency with the help of linear equalization at the users. In order to analyze the performance of proposed model showing the effect of fading and multiplexing gain, we derive the closed-form analytical expressions for the ergodic secrecy multicast capacity and the secure outage probability with and without equalization. Then, we study the effect of fading and shadowing, and the number of users, eavesdroppers and relays on the ergodic secrecy multicast capacity and the secure outage probability assuming channel state information at the receiver. The secure outage performances of the proposed model with zero-forcing (ZF) case are also compared without the case of ZF. In addition, we show the effect of the number of user and eavesdropper antennas and the distances from relays to users and eavesdroppers on the secure outage probability, and a comparison is shown between the composite and Rayleigh fading environments. Finally, the analytical expressions are verified via Monte Carlo simulation.

Keywords: Cooperative spatial multiplexing, security, secure outage probability, zero-forcing equalization.

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