

A WIRELESS COMMUNICATION SCHEME USING HYBRID NOMA-PLNC RELAY

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Abstract

In this paper, a novel system model is proposed to improve the achievable rate of the Fifth Generation (5G) wireless network using a hybrid Non-Orthogonal Multiple Access (NOMA)-Physical Layer Network Coding (PLNC) relay. In this proposed model, one base station and two users are considered and the base station acts as a relay to exchange the information of the two users over the two time slots. In the first time slot, two users sent their information simultaneously to the hybrid relay over the Multiple Access Channels (MAC) where both received signals are added using XOR operation to exploit the Network Coding (NC) in physical layer and then the resulting modulated signal is transmitted to the same two users over the Broadcast Channel (BC) in the second time slot. The major contribution of this proposed network is that the concept of the NOMA is applied at PLNC based relay such that one PLNC modulated signal with power level of α and the other PLNC modulated signal with the power level of $1-\alpha$ is added in the same channel using the Superposition Coding (SC). Consequently, the relay node allows the four users to operate on the same bandwidth and the time slot on the downlink channel. Thus, the proposed 5G wireless network could achieve both temporal efficiency and the spectral efficiency.

Keywords: Non-Orthogonal Multiple Access (NOMA), Physical Layer Network Coding (PLNC), Fifth-Generation (5G).