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Babikir, M.H.[a] , Hamid, K.[a] , Abdu, G.A.M.[a] , Elsayed, I.[b] , Saeed, R.A.[c] , Khalifa, O.O.[d e]

**Optimization Efficiency of 5G MIMO Cooperative Spectrum Sharing NOMA Networks**
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[a] Uni. of Science & Technology, Dept. of Comm. Systems, Khartoum, Sudan
[b] Uni. Malaysia Pahang, Dept. of Electrical and Electronic Eng., Pahang, Malaysia
[c] School of Elecs Eng., Sudan Uni. of Sci. and Tech., Faculty of Eng., Khartoum, Sudan
[d] Inter. Islamic Uni., Dept of Elec and Comp Eng, KL, Malaysia
[e] Info. Tech., Libyan Center for Engineering Research, Bani Walid, State of Libya

## Abstract
Non-orthogonal multiple access (NOMA) may improve spectrum efficiency (SE) in 5G and other future networks. Cognitive radio (CR) and multiple accesses might be beneficial for SE. A new era of productive communication with the combination of NOMA's network-oriented multi-access capabilities and the CR network (CRN) was anticipated. This research enhances the SE of the NOMA power domain (PD) in the downlink (DL) by utilizing cooperative cognitive radio networks (CCRNs). If the primary user (PU) is unable to receive data on the dedicated channel due to noise or interference, this strategy is expected to prove beneficial. Two network topologies with 100 MHz bandwidths and quadrature phase shift keying (QPSK) were proposed. Also used are 8×8, 16×16, and 32×32 Multiple Input Multiple Output (MIMO) topologies, which differ in transmit powers, user distances, and power location coefficients. Channel instability and successive interference cancellation (SIC) are also considered in performance studies. Fading channels are Rayleigh-fading, with frequency selectivity. MATLAB calculates the model's SE. SE performance is 35%, 44%, and 73% better for 8×8, 16×16, and 32×32 MIMO NOMA, while CCRN 8×8, 16×16, and 32×32 MIMO NOMA enhances SE performance by 50%, 65%, and 80%, respectively, when compared with the standard NOMA model. Using MIMO technology boosts SE significantly. © 2024 IEEE.

## Author Keywords
Cooperative Cognitive Radio Network (CCRN);  Multiple-Input and Multiple-Output (MIMO);  Non-orthogonal multiple access (NOMA);  Spectrum Efficiency (SE)

## Index Keywords
4G mobile communication systems, 5G mobile communication systems, Amplitude shift keying, Communication channels (information theory), Cooperative communication, Directed graphs, Error statistics, Fading channels, Frequency shift keying, Multiple access interference, Quadrature phase shift keying, Radio access networks, Rayleigh fading, Trees (mathematics); Cooperative cognitive radio network, Cooperative Cognitive Radio Networks, Multiple access, Multiple input and multiple outputs, Multiple-input and multiple-output, Non-orthogonal, Non-orthogonal multiple access, Performance, Spectra efficiency, Spectrum efficiency; Cognitive radio

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