Hyperchaotic Based Encrypted Audio Transmission via Massive MIMO - GFDM System using DNA Coding in the Antenna Index of PSM

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Abstract:
In recent times, due to the rapid growth in the use of modern wireless technologies and networks, the number of users and devices has substantially increased. These technologies transfer a huge amount of sensitive information such as audio over open-access networks. Transferring this information through networks may be subject to eavesdroppers. Therefore, an urgent need for modern encryption techniques to safeguard these contents. The chaotic algorithm can be applied to provide high information security. In this paper, Generalized Frequency Division Multiplexing (GFDM) is presented with chaos theory in order to improve the security of 5G wireless communications. The proposed system employs Parallel Spatial Modulation (PSM) as a transmission scheme and various chaotic maps integrated with DNA encoding to generate strong secret keys. Two-level XOR operations are used inside PSM to achieve audio encryption, the first XOR is performed between the index of the active antenna and the secret key generated by Henon and the Logistic map while the second XOR is executed between signal constellation bits and the Tinkerbell map. The proposed systems are implemented and evaluated using various measurements comprising Cpestral Distance (CD), Signal to Noise Ratio (SNR), Spectral Segment SNR, Peak SNR, and mean square error (MSE). The audio is reliably secure and untraceable, according to all examinations of the proposed system, and this gives an appropriate level of protection.

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