



# Spectrum Leasing via Cooperation for Enhanced Physical-Layer Secrecy

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Spectrum leasing via cooperation refers to the possibility of primary users leasing a portion of the spectral resources to secondary users in exchange for cooperation. In the presence of an eavesdropper, this correspondence proposes a novel application of this concept in which the secondary cooperation aims at improving secrecy of the primary network by creating more interference to the eavesdropper than to the primary receiver. To generate the interference in a positive way, this work studies an optimal design of a beamformer at the secondary transmitter with multiple antennas that maximizes a secrecy rate of the primary network while satisfying a required rate for the secondary network. Moreover, we investigate two scenarios depending upon the operation of the eavesdropper: i) the eavesdropper treats the interference by the secondary transmission as an additive noise (single-user decoding) and ii) the eavesdropper tries to decode and remove the secondary signal (joint decoding). Numerical results confirm that, for a wide range of required secondary rate constraints, the proposed spectrum-leasing strategy increases the secrecy rate of the primary network compared to the case of no spectrum leasing.

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