Polar Codes for Covert Communications over Asynchronous Discrete Memoryless Channels

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Abstract—We develop a covert communication scheme for binary-input asynchronous Discrete Memoryless Channels based on binary polar codes, in which legitimate parties exploit uncertainty created by both the channel noise and the time of transmission. The proposed code jointly ensures reliable communication for a legitimate receiver and low probability of detection with respect to an adversary, both observing noisy versions of the codewords. Binary polar codes are used to shape the weight distribution of codewords and ensure that the average weight decays as the block length grows. The performance of the proposed code is limited by the speed of polarization, which in turns controls the decay of the average codeword weight with the block length. Although the proposed construction falls short of achieving the performance of random codes, it inherits the low-complexity properties of polar codes.

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