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High Gain Multilevel QAM Coding

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Abstract

A systematic way of designing practical high gain moderate latency multilevel trellis codes is developed. Three multi-level GU partitions leading to the 8-way 'Ungerboek' partition of 2D QAM are investigated. They are compared by evaluation of the capacity on each level, under the constraint that 'mod-lambda' front-ends are used at the multistage decoder to reduce decoding complexity. The implications of the capacity curves, on complexity, rates and latency of codes that achieve large effective coding gain, are discussed. Group coding techniques are used to design the component codes, and simulations and bounds are provided for the proposed multilevel schemes.

Analogous multi-level schemes are also applied to a modified non-regular QAM/PSK constellation. This constellation is attractive because it has a reduced peak-to-average power ratio as compared to regular 16QAM, while its capacity is almost the same. Codes are proposed and simulations are provided for this case as well.