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Comparative study of a time diversity scheme applied to G3 systems for narrowband power-line communications

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Abstract

Power-line communications can be used for the transfer of data across electrical networks in applications such as automatic meter reading in smart grid technology. As the power-line channel is harsh and plagued with non-Gaussian noise, robust forward error correction schemes are required. This research is a comparative study where a Luby transform code is concatenated with power-line communication systems provided by an up-to-date standard published by électricité Réseau Distribution France named G3 PLC. Both decoding using Gaussian elimination and belief propagation are implemented to investigate and characterise their behaviour through computer simulations in MATLAB. Results show that a bit error rate performance improvement is achievable under non worst-case channel conditions using a Gaussian elimination decoder. An adaptive system is thus recommended which decodes using Gaussian elimination and which has the appropriate data rate. The added complexity can be well tolerated especially on the receiver side in automatic meter reading systems due to the network structure being built around a centralised agent which possesses more resources.