Power line communication transfer function computation in real network configurations for performance analysis applications

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Abstract-

Despite Power Line Communication is considered a cost-effective solution to communicate electronic devices across the power system, the performance of this technology is highly affected by physical channel factors like the presence of noise and signal attenuation. Such phenomena are mainly determined by the characteristics of the electrical infrastructure as well as by the network topology. This article presents an analytical approach to systematically compute the signal attenuation between any pair of nodes in real electric power distribution network topologies based on transmission-line theory and graph theory. The proposed methodology has been applied to obtain the attenuation matrix of two representative networks for low and medium voltage. Additionally, the results have been used to analyse the communication performance of these networks, where the low voltage network shows better results due to the reduced number of nodes and network length. The conclusions of this study motivate the application of this methodology to power line communication networks planning.

Index Terms-