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A novel approach for Voltage Control Using Optimal Power Flow within Web-of-Cells Concept

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This paper focuses on a novel proposal for decentralized voltage control introduced within the Web-of-Cells [1] (WoC) concept in ELECTRA IRP [2] project. This new approach, called Post-Primary Voltage Control [3] (PPVC), aims to keep the voltages within safe limits defined by the regulations and to minimize power losses in lines of a cell. Towards this direction, the re-definition of voltage set-points in all controllable nodes within this area is performed using an Optimal Power Flow (OPF) algorithm. The algorithm presented in this paper also considers the tap changing function of the transformers, thus ensuring the optimality of the proposed control. Generalized Algebraic Modelling System (GAMS) tool was used for the development of the algorithm. The evaluation of the algorithm is conducted on the European CIGRÉ MV network [4] with distributed energy resources (DERs), comparing the results of the proposed method with the traditional voltage control techniques.

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