

A novel methodology for the scalability analysis of ICT systems for smart grids based on SGAM: the InteGrid project approach

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Abstract-

Information and Communication Technology (ICT) infrastructures are at the heart of emerging Smart Grid scenarios with high penetration of Distributed Energy Resources (DER). The scalability of such ICT infrastructures is a key factor for the large scale deployment of the aforementioned Smart Grid solutions, which could not be ensured by small-scale pilot demonstrations. This paper presents a novel methodology that has been developed in the scope of the H2020 project InteGrid, which enables the scalability analysis of ICT infrastructures for Smart Grids. It is based on the Smart Grid Architecture Model (SGAM) framework, which enables a standardized and replicable approach. This approach consists of two consecutive steps: a qualitative analysis that aims at identifying potential bottlenecks in an ICT infrastructure; and a quantitative analysis of the identified critical links under stress conditions by means of simulations with the aim of evaluating their operational limits. In this work the proposed methodology is applied to a cluster of solutions demonstrated in the InteGrid Slovenian pilot. This pilot consists of a Large Customer Commercial Virtual Power Plant (VPP) that provides flexibility in medium voltage for tertiary reserve and a Traffic Light System (TLS) to validate such flexibility offers. This approach creates an indirect Transmission System Operator (TSO)-Distribution System Operator (DSO) coordination scheme.

Index Terms- Scalability Analysis; Information and Communication Technology; Modeling; OMNeT++; Smart Grid Architecture Model

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