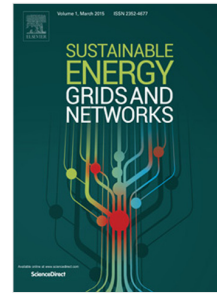


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# A Cloud-based Smart Metering Infrastructure for Distribution Grid Services and Automation

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## Abstract

The evolution of the power systems towards the smart grid paradigm is strictly dependent on the modernization of distribution grids. To achieve this target, new infrastructures, technologies and applications are increasingly required. This paper presents a smart metering infrastructure that unlocks a large set of possible services aimed at the automation and management of distribution grids. The proposed architecture is based on a cloud solution, which allows the communication with the smart meters from one side and provides the needed interfaces to the distribution grid services on the other one. While a large number of applications can be designed on top of the cloud, in this paper the focus will be on a real-time distributed state estimation algorithm that enables the automatic reconfiguration of the grid. The paper will present the key role of the cloud solution for obtaining scalability, interoperability and flexibility, and for enabling the integration of different services for the automation of the distribution system. The distributed state estimation algorithm and the automatic network reconfiguration will be presented as an example of coordinated operation of different distribution grid services through the cloud.

*Keywords:* Distribution grid automation, cloud architecture, cloud services, smart metering infrastructure, state estimation, network reconfiguration.

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## 1. Introduction

Over the last two decades significant changes have been affecting the power system. The deregulation of the energy market, the increasing penetration of

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