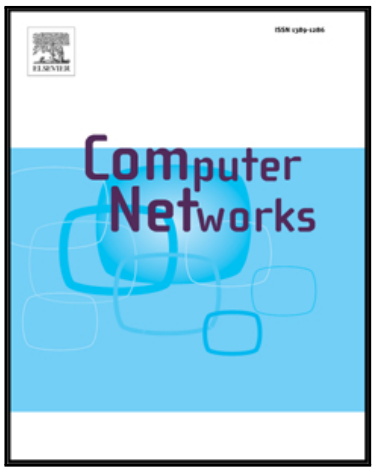


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# Cloud-based IoT solution for State Estimation in Smart Grids: exploiting virtualization and edge-intelligence technologies

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**Abstract**

Smart Grids (SGs) are expected to be equipped with a number of smart devices able to generate vast amounts of data about the network status, becoming the key components for an efficient State Estimation (SE) of complex grids. To exploit their potentials, the ICT infrastructure needs to be scalable to follow the increasing amount of data flows and flexible to give the possibility to assign and re-assign grid functions and data flow control policies at runtime, possibly in a context-aware manner. In this scenario, this paper proposes and validates a Cloud-IoT-based architectural solution for SE in SG that combines cloud-capabilities and edge-computing advantages and uses virtualization technologies to decouple the handling of measurement data from the underlying physical devices. Case studies in the field of distribution networks monitoring are also analyzed, demonstrating that the proposed architecture is capable to accomplish the assigned operational tasks, while satisfying the needed quality level from both the communication and the grid perspectives with a significant degree of flexibility and adaptability with respect to state of the art solutions.

*Keywords:* Smart Grid, Internet of Things, Cloud, Edge, Virtualization, State Estimation, Phasor Measurement Unit

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