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Sparse Data Proxy Actuation for the Electrical Grid: Proxy Utilization with a Q-Input Harmonization Method for System Estimation

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Abstract

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Abstract:

For a distribution utility within the energy ecosystem, the prototypical minimum requisite data, as specified by many IEEE engineers, for the determination of monitoring tap points at the nexus of incoming transmission lines and outgoing feeder lines is as follows: power system frequency, substation battery voltage, typical bus operating voltages, Current Transformer (CT)/ Potential Transformer (PT) ratios (primary and secondary), and short circuit levels. Interestingly, since the 1990s, many areas of the world have divided the electric power ecosystem into distinct and disparate generation, transmission, and distribution systems to provide a more competitive electricity market. Generally, this has led to improvements in efficiency. However, in some cases, these artificial demarcations have also led to situations wherein key data is siloed and not readily available for system-wide grid optimization analyses. For the case of strategic/critical infrastructure, this paradigm is generally deemed to be problematic, and in certain exigency circumstances, it is necessary to actuate upon proxy assumptions (e.g. impedance) and limited (i.e. sparse) data to posit the required information fields. This paper presents a Q-Input Harmonization Method, which facilitates the utilization of proxies for system estimation within a Smart Grid.

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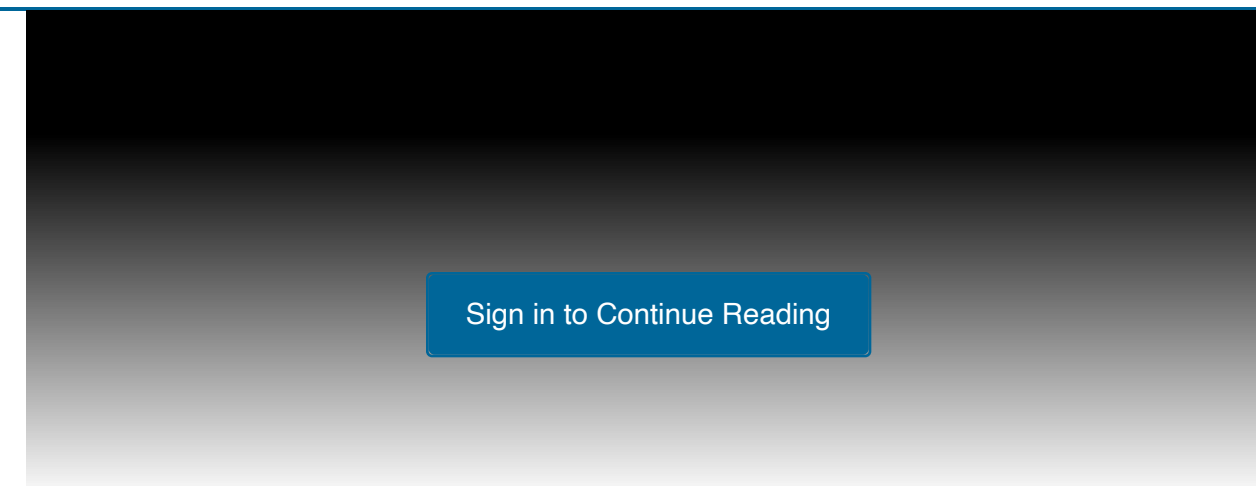
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