Electrical islanding detection based on the integration of synchronized phasor measurements

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Abstract:
Detecting unintentionally formed electrical islands is an important capability for operating power systems that include increasingly higher rates of renewable energy. In turn, evolving international standards for the interconnection of renewable energy sources set the stage for a race to detect electrical islands as quickly as possible. In order to win such a race, islanding detection methods must overcome significant technical challenges, including the accurate capture of massive streaming data, rapid signal processing, and the application of complex algorithmic functions. In addition, speed is not the sole determining factor of success, as detection methods must also be adequately sensitive to identify islanding events under a range of conditions, and stable against false identification during conditions similar to islanding. In response, our research explores a synchrophasor analytics system for archipelagos, which utilizes synchronized phasor measurement units to gather more robust data from electric power signals. In maximizing the utility of such measurement tools, the synthetic logic of signal processing requires careful calibration. This includes filtering the raw power signal effectively while preserving higher-order harmonics for analytic applications. In addition, systematically organizing various islanding detection techniques into a clear ontological framework helps to guide the development of optimal combinatorial detection schemes.

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