

UI-ASSIST WEBINAR: Nano-Grid Participation in The Wholesale Electricity Markets: Challenges And Opportunities

Thursday, September 22, 9:00 am PT (9:30 pm IST)



U.S. INDIA COLLABORATIVE FOR SMART DISTRIBUTION SYSTEM WITH STORAGE



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Nano-Grids (n-Grids) are customer-owned energy production/storage assets interfaced to the electric grid. Due to the n-Grid flexibility, this customer energy resource can improve the reliability and resilience of power systems. An appealing option is to leverage n-Grid flexibility for ancillary service product (ASP) procurement in the wholesale electricity market (WEM). This option is backed by the FERC Order 2222 which requires planning of the ISOs across the United States for the participation of DER aggregators in the ASP markets. n-Grids are uncertain flexibility resource agents and require an aggregator to act as a procurement agent for the n-Grid participation in ASP. Such a framework may encounter challenges in terms of optimal market participation, cybersecurity of communications, and secure transaction recording. We propose an optimal bidding strategy model for n-Grid aggregator participation in the WEM energy and ASP markets. In this vein, we develop a risk-averse optimization to determine the optimal energy and ASP products to trade in the day-ahead market while considering proper participation in the real-time market. Next, we assess the impacts of weather-based distribution feeder outages on n-Grid performance and utilize the outage risk predictions to improve the performance of n-Grids during and after outages. Finally, we propose implementing the blockchain technology to securely record the data exchange between n-Grids, aggregator, and other involved entities. The stored data is used for transaction verification and traceability of procured ASP services.

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Mohammad Khoshjahan (Graduate Student Member, IEEE) is currently pursuing the Ph.D. degree with the Department of Electrical and Computer Engineering, Texas A&M University. His research interests include power grid management and operation, smart grids, power system flexibility, electricity market design, and asset management. He was a recipient of the 2021 Texas A&M Energy Institute Graduate, and the 2019, 2021, and 2022 Thomas & Powell Industries fellowships. He also served as the technical chair at the 2021 IEEE Texas Power and Energy Conference (TPEC 2021).