

Distributed Signatures: A Policy Switching Approach to the Coordination of Protection Schemes

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Abstract: In recent years there have been many improvements in the reliability of critical infrastructure systems. Despite these improvements, the power systems industry has seen relatively small advances in this regard, particularly due to the limitations of centralized management frameworks. Though progress has been made in improving generation, transmission, and distribution infrastructure, remedial action schemes (RAS) remain non-standardized and are often not uniformly implemented across different utilities, ISOs, and RTOs.

In this talk we will discuss a novel, algorithmic approach to selecting RAS policies to optimize the operation of the power network during and after a contingency. Specifically, we use policy-switching to consolidate traditional load shedding and islanding schemes. Policy switching is an algorithmic approach to selecting and executing the policy that exhibits the best performance according to Monte-Carlo simulation techniques. As time progresses, this approach may switch between multiple policies, depending on the specific way that the grid system evolves and according to distributed signatures that stem from subsystems. This methodology has been used in machine learning and artificial intelligence spheres to improve the outcomes of multiple control problems ranging from real-time strategy (RTS) games to networking. Grid protections provide similar control issues in that there is a wide breadth of RAS policies to choose from.

Bio: Eduardo Cotilla-Sanchez received the Ph.D. degree in Electrical Engineering from the University of Vermont in 2012, under the supervision of Dr. Paul Hines. He joined Oregon State University in Sept. 2012 as an Assistant Professor at the School of Electrical Engineering and Computer Science. His primary field of research is the vulnerability of electrical infrastructure, in particular, the study of cascading outages. This interest spires into several other research areas such as nonlinear dynamics, complex systems, smart grid, and big data. Cotilla-Sanchez is the Secretary of the IEEE Cascading Failure Working Group.