

## NM SMART Grid Center Webinar Series

### NM National Laboratories & NM SMART Grid Center–Related Research

Arthur Barnes, Los Alamos National Laboratory (LANL)

Jay Johnson, Sandia National Laboratories (SNL)

*Date of Webinar:* Friday, November 22

*Time:* Noon – 1:00 PM MT

### Abstract

**LANL presentation:** Protection of inverter-interfaced microgrids is a challenging problem because many of the assumptions made in traditional protection breakdown. The difficulties in protecting such microgrids include: 1) lack of fault current from inverter-interfaced generation, 2) varying fault current between grid-connected and islanded modes, 3) potential for normally-meshed operation, and 4) unbalanced operation due to single-phase loads. It is worth noting that not all microgrid designs will include all these challenges. For example, microgrids could choose to omit meshed operation. Here, Dr. Barnes will present on potential protection solutions for microgrids with a focus on adapting admittance protection, commonly used for line protection in networked transmission systems.

**SNL presentation:** Sandia National Laboratories recently completed a project on distribution voltage regulation provided by multiple Distributed Energy Resource (DER) control strategies including Volt-Var, Extremum Seeking Control, and State Estimation-Based Optimal Power Factor commands. The DER commands were issued from a commercial software vendor’s Advanced Distribution Management System (ADMS) to live PV inverters and multiple simulated utility-scale PV devices at Sandia National Laboratories’ Distributed Energy Technologies Laboratory (DETL). The control strategies were demonstrated on reduced-order utility feeder models with DER operating under variable irradiance conditions and then on a live feeder in Massachusetts. This presentation will cover the research approach and results of the two-year project.

### **Speaker Bios**



**Arthur Barnes** is a power systems engineer in the Information Systems & Modeling group at Los Alamos National Laboratory. His current interests include geomagnetically induced currents (GIC) in electrical transmission networks, analysis of protective devices, and design of microgrid systems. He holds a Ph.D, M.S and B.S. in electrical engineering from the Universities of Arkansas, Florida, and Colorado respectively.



**Jay Johnson** is a Principal Member of Technical Staff at Sandia National Laboratories. Jay leads several multidisciplinary research projects focused on power systems control, electric vehicle charging, DER cybersecurity, and renewable energy integration. He has seven patents and has authored over 100 technical publications.