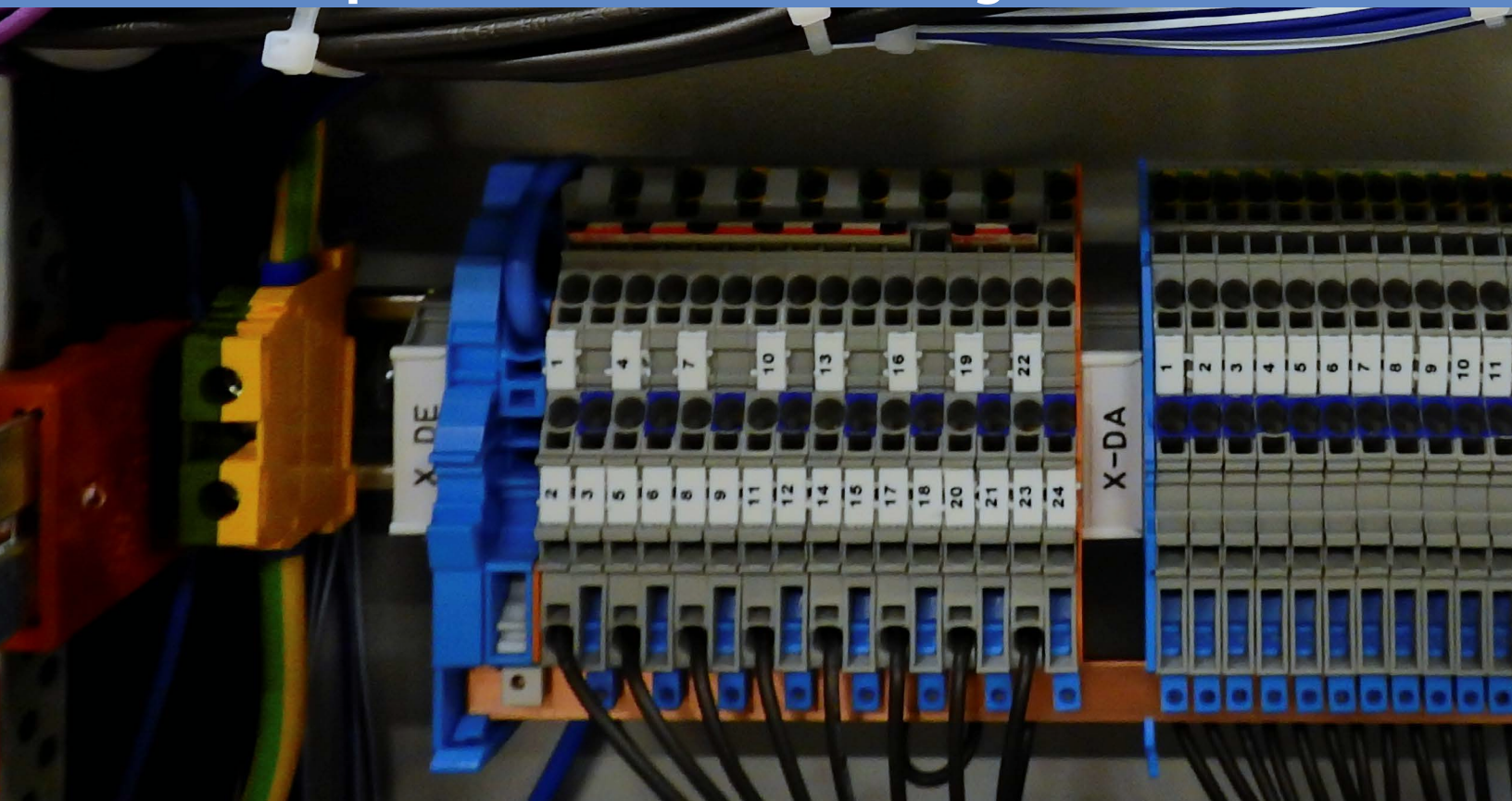CEATI
INTERNATIONAL

6th Annual

Protection and Control

Enhancing Electric Network Resiliency and Efficiency through Modernization of Protection and Control Systems

April 9-10, 2019 • Los Angeles, CA

OVERVIEW

The 6th Annual Protection and Control Conference will encompass several areas identified by members of the CEATI Protection and Control Program. The conference themes focus on innovative protection system design and maintenance; application and management of modern digital protection relays; management and advanced analytics of large information databases; enhanced integration of DGs and microgrids (specifically in relation to the revised IEEE 1547 standard); new protection, control and communication technologies; and topics related to hydroelectric generation protection and control technologies.

THEMES

1 Innovative Approaches for Optimizing Protection System Design, Maintenance, and Replacement Strategies

- Systems design standards/guidelines and recognized best practices for transmission and distribution stations protection and control– e.g. development of modular protection design standards
- Applications of the IEC 61850 protocol in the design of new substations, and training requirements for utility staff involved in the design, commissioning, and maintenance of such facilities
- Experiences from the application of IEC 61850 standards, including GE Process Bus and BRICS modules, in substation design and operation
- Optimization of protection system relay replacement strategies, including relay data management systems
- Best practices in protection systems maintenance and data management supporting audits for compliance with NERC reliability standards
- Cyber-security – standards, guidelines, and best practices in managing risks from cyber attacks
- Management and analytic processes of large volumes of data, including automated analyses and evaluation of protection responses to system faults
- Using SCADA in combination with digital protection relays capabilities for station automation

2 Enhanced Utilization of Modern Digital Relay Capabilities for Station Automation and "Smart Grid" Applications

- Detecting irregular performance of power system elements, including breaker restrikes, harmonics-caused resonant conditions, and GICs and power transformer saturation conditions
- Detection and recognition of waveform signatures for identifying incipient system faults and their locations
- Digital relay logic programing capabilities, for initiating appropriate control actions to minimize power outages and/or facilitate automation of network operations
- Use of smart meter data in conjunction with information from digital relays for improvements in locating permanent, transient, and high-impedance faults in distribution systems
- Use of digital relays for SCADA RTU function

3 Technologies and Techniques for Improved Integration of Distributed Generators and Microgrids

- Emerging power system protection and control issues caused by inertia-less, intermittent generators
- Potential changes in power system dynamic characteristics, impact on conventional generator control systems responses, and requirements for optimal coordination with DG controls
- Novel technologies capable of introducing "synthetic inertia" into power system; their technical characteristics and uses for power system stability enhancements
- Application and means of coordination of smart inverters to facilitate improved voltage and frequency regulation and mitigation of power swings
- Technologies and techniques for enabling autonomous operation of microgrids during transient system events and their seamless re-synchronization with the main grid upon its stabilization
- Economic impacts of high levels of DG penetration upon distribution or bulk power system operation, and possible mitigation solutions, including application of energy storage systems

4 New Power System Protection, Control, and Communication Systems Technologies

- Methods for accurate location system faults, including high-impedance faults
- Identifying and locating major system performance issues and possible automation of switching required to mitigate system impact
- Technologies designed to improve system security, such as new wide-area monitoring schemes, synchrophasor measurements and their applications, near-real-time power system computer modeling and state estimation techniques, and new methods for power system simulation and protection coordination verification.
- Technologies that increase the level of power system automation and enhance electric supply power quality
- Technologies and methodologies that reduce the overall power system capital investment and operating costs

5 New and Emerging Protection and Control Technologies for Hydroelectric Power Generators

- Design standards/guidelines and recognized best practices for generator protection and control systems
- Protection philosophies and technologies for minimizing arc flash energy in the station's main generator and auxiliary service switchgear
- Generator fault analysis and case studies
- Modeling of generator controls for coordinating generator and/or transmission system protection relaying, including schemes designed for ensuring power system integrity during major disturbances
- Model validation techniques and methodologies for generator governor and excitation systems
- Aging technology, including reliability, adequacy of existing protection, and control schemes, end of life determination, and best practices in development of business cases for optimal improvements
- New generator ground fault detection schemes ensuring reliable 100% zone coverage
- Techniques, experiences and best practices in remote generation plant monitoring and operations
- Protection and controls issues arising from increased participation of intermittent, inverter-based generators in power system energy generation and active voltage and frequency controls
- Requirements for effective coordination and performance monitoring/verification of all generator control systems

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7:30-8:30 Registration & Breakfast

Session 1: Innovative Approaches for Optimizing Protection System Design, Maintenance, & Replacement Strategies   📍 *California*

8:30-9:00	**How the Engineering Design Process Can Simplify the Testing of Automation and Control Systems**	*Eugenio Carvalheira, OMICRON*
9:00-9:30	**Best Practices for Developing and Implementing a New Protection Design Standard**	*Scott Hayes & Aaron Feathers, Pacific Gas & Electric*
9:30-10:00	**Bridging the Gap**	*Robert Brennan & Marc Nadeau, Voltra*

10:00-10:30 Break

10:30-11:00	**Automated Approach for Compliance with PRC-027-1 Requirements for Protection System Coordination of BES Elements**	*Saman Alaeddini, Quanta Technology*
11:00-11:30	**Uncertain Negative Sequence Quantities**	*Rich Bauer, NERC*
11:30-12:00	**Maximizing LiDAR to Validate Protection Models**	*Baldwin Yeung, CMYSolutions*

12:00-1:30 Lunch

Session 2: Enhanced Utilization of Modern Digital Relay Capabilities for Smart Grid Applications   📍 *California*

1:30-2:00	**Using SCADA in Combination with Digital Protection Relays Capabilities for Station Automation**	*Vitaliy Mykhaylychenko, Hydro One*
2:00-2:30	**How Stand-Alone Merging Units Can Pave the Way Towards More Digital Substations and IEC61850 Protection Schemes Meanwhile Leveraging Existing Measuring Assets**	*Vincent Balvet, Vizimax*
2:30-3:00	**Digital Substations: A Journey…Not a Destination**	*Dustin Tessier, TESCO*

3:00-3:30 Break

Session 3: Technologies and Techniques for Improved Integration of Distributed Generators and Microgrids   📍 *California*

3:30-4:00	**How New Controlled Switching Techniques Permit Rethinking Power Quality, Protection and Maintenance Schemes in Today's Medium and High Voltage Power Systems**	*Vincent Balvet, Vizimax*
4:00-4:30	**Simultaneous Voltage and Phase Control for Inverter-based Distributed Generation Through Synthetic Inertia**	*Shahab Mehraeen, Louisiana State University*
4:30-5:00	**DNP3 Profile for DER Interconnections**	*Grant Gilchrist, TESCO*

5:00-7:00 Reception

Agenda is subject to change without notice.

Protection & Control

April 10, 2019 - Day 2

7:30-8:30 Registration & Breakfast

Session 4: New Power System Protection, Control, & Communication Systems Technologies

📍 *California*

Time	Title	Presenter
8:30-9:00	**Teleprotection with MPLS Ethernet Communications: Development and Testing of Practical Installations**	*Tariq Rahman, San Diego Gas & Electric & Michael Bryson, Schweitzer Engineering Laboratories*
9:00-9:30	**The Ground Fault Neutralizer: Smart Bushfire Protection for Australia**	*Klaus Winter, Swedish Neutral Holding AB*
9:30-10:00	**Travelling Wave Measurements for Detection of Transmission Line Incipient Faults**	*Richard Kirby, Schweitzer Engineering Laboratories*

10:00-10:30 Break

Time	Title	Presenter
10:30-11:00	**Improving Low-voltage DC Circuit Breaker Performance Through an Alternate Commutating Circuit**	*Shahab Mehraeen, Louisiana State University*
11:00-11:30	**DeltaVAR Paralleling**	*Wayne Hartmann, Beckwith Electric*
11:30-12:00	**Power System Protection Emulation in EMTP**	*Mehrdad Rostami & Hassan Fayaz, Stantec*

12:00-1:00 Lunch

Session 5A: New Ways of Using Power System Data for Enhanced Operational Efficiency & Power Quality Improvement

📍 *San Diego*

Time	Title
1:00-1:30	**Detecting High Impedance Faults on Overhead Distribution Systems** *Wilsun Xu, Electric Power Solutions*
1:30-2:00	**Automatic Data Analysis Visualization of Digital Substation Events** *Yujie Yin, Quanta Technology*
2:00-2:30	**Automatic Disturbance Data Collection and IED Management** *Sterin Jose, ASE / Kalkitech*
2:30-3:00	**Enhancing Connectivity of DGs by Control Coordination of Smart Inverters** *Rajiv Varma, SMG Power Consultants*

Session 5B: New & Emerging Protection & Control Technologies for Hydroelectric Power Generators

📍 *California*

Time	Title
1:00-1:45	**Switchgear Fault Damage, Analysis and Repair: Allatoona Dam** *Kirk Chen, U.S. Army Corps of Engineers*
1:45-2:15	**Automated Control System Operational Challenges in Hydro Generation** *Laurel Brandt, Tennessee Valley Authority*
2:15-2:45	**Practical Considerations for Performing Testing on Bulk Electric System Generating Units for Compliance with NERC Standards** *Jesse Rocca, Ontario Power Generation*
2:45-3:15	**Control Systems Integration for Unmanned Operation of Remote Small Hydro** *Fon Hiew, New Brunswick Power*

Break until 3:30

Time	Title
3:30-4:00	**Micro-Synchrophasors and Thumping: A New Technology for Understanding Grid Stability** *Alex McEachern, McEachern Laboratories*
4:00-4:30	**Surge Protection and Power Protections** *Ghassan Nasrallah, Eaton*
4:30-5:00	**Large Customer Dashboard** *Peter Cooney, Toronto Hydro*
5:00-5:15	**Concluding Remarks** *Dennis Hansen, CEATI International*

Time	Title
3:30-4:00	**Generator Protection Event Waveform Analysis** *Scott Cooper, OMICRON*
4:00-4:30	**Stator Ground Protection for Multiple High-Impedance Grounded Generators Sharing a Common Bus** *Ritwik Chowdhury, Schweitzer Engineering Laboratories*
4:30-5:00	**Automatic System for Efficiency and Calculation of the Combination Curve of Kaplan and Bulb Turbines** *Mike Wallin, Reivax*
5:00-5:15	**Concluding Remarks** *Jerry Lepka, CEATI International*

Agenda is subject to change without notice.

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