CEATI | Protection and Control

Protective relays and control systems are devices deployed throughout the power system for the purpose of sensing abnormal power system or system components' operating conditions and initiate fast corrective action. In case of electrical faults, they quickly isolate, usually in conjunction with circuit breakers, any abnormal conditions resulting from natural events, physical accidents, equipment failure, or operation failure due to human error. In the case of power system operation, they quickly restore the voltage and frequency stability. The reliable, selective, and high-speed performance of protection and control devices is necessary to mitigate damage to vital and expensive system equipment, reduce the risk of serious personal danger, and to maintain power system stability and acceptable power quality. These stringent requirements, with high potential consequences, make it imperative that protection and control systems are designed and maintained to perform their functions with a very high degree of dependability and security.

The main objective of the Protection & Control interest group is to bring industry professionals together to identify, discuss, and develop solutions to common as well as new and emerging issues by creating a networking opportunity for utilities concerned with the application, optimization, and innovative use of protection and control technologies in their power systems. It also serves as a forum for identifying knowledge gaps and providing guidance on future research and technology development initiatives as well as provides a platform for collaborative research projects.

Topics & Issues

1. Management of Protection Assets and Investment Strategies
2. Protection System Design, Standards, and Utility Practices
3. Substation Automation – Experiences and Best Practices
4. Optimizing Protection System Maintenance and Compliance Reporting
5. Protection & Control Challenges and Opportunities with Growing DG and Microgrid Presentation
6. Introduction of New and Emerging Protection Technologies

Technical Advisor

Mr. Jerry Lepka is the Technical Advisor to the Protection & Control interest group (P&C). A graduate of the University of Manitoba, Mr. Lepka has worked both abroad and in Canada managing complex technical operations and implementing new technologies. His most recent project was with GRIDCo power utility in Ghana, performing power system audits, with a special focus on protection systems. Mr. Lepka's career also includes many years in P&C discipline with Ontario Hydro (now Hydro One) as District P&C Engineer in the Toronto and Cherrywood Districts. He also spent several years in Ghana, West Africa, as a P&C Instructor and later on as Director of the newly-formed Transmission System Division for the national power utility, Volta River Authority.

Protection and Control

Core Topics and Focus Areas

- Standardization of protection systems design and settings establishment practices
- Requirements for coordination of relay settings between utilities and connection customers
- Maintenance and testing philosophies of new digital relays-based protection systems
- Management of the entire relay protection systems development process
- Protection innovations that improve power system performance
- Generator protection and control systems – new technologies and best practices
- Use of digital relays with PQ monitoring capabilities for detecting equipment/system performance irregularities and identifying incipient faults and their locations
- High impedance fault detection techniques and utility application experiences
- Unusual events: description, root cause analysis, lessons learned
- Improvements in arc-flash technology to achieve "safe" arc-flash energies
- IEC 61850 application, commissioning, testing practices, and cyber security considerations
- New or emerging protection and control technologies
- Improvements in DG and Microgrids connectivity (e.g., innovative uses of smart inverters)
- NERC regulatory requirements and compliance reporting
- Relay settings review practices associated with power system evolution/expansion
- Issues with high voltage transformer paralleling and tapchanger controls
- Voltage regulation support by DGs and impact on utility operations
- Lifespan of digital relays and replacement strategies
- Ethernet connectivity of protective relays and cyber security considerations
- Effective protection systems maintenance practices (e.g., TBM vs. CBM vs. PDM)
- Minimum training requirements for new P&C personnel

Completed Projects

- Effective and secure protection settings data management and storage
- Guide for IEC 61850 standard applications

Projects Under Development

- Detecting High Impedance Faults on Overhead Distribution Systems
- Anti-Islanding Techniques for Distribution Systems
- Control and Protection Challenges with Increased Penetration of Inertia-less Intermittent Distributed Generators
- Setting and Maintenance of Power System Stabilizers as Part of Generator Excitation Control Systems

Annual Activities

- 2-Day Annual Industry Conference
- 2 Face-to-Face Meetings
- Regular Conference Calls
- 3-5 Training Webinars
- On-Demand Information Exchange
- Collaborative Project Development

*Participation is open to Electrical Utilities and Government Agencies.

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