Advanced Distribution Management System Challenges Incorporating Distributed Energy Resources

Background

Distribution Management Systems continue to advance and are becoming more widely deployed around the world. They are providing critical applications in an integrated manner - advanced voltage control, improving reliability and resilience through automation and reconfiguration, reducing losses, integrating distributed renewables and storage, integrating load and demand management, making distribution protection more dynamic, and providing services for the transmission network. These functions require an accurate real-time model of the distribution network as well as a more advanced customer model that includes the dynamic load, generation and storage characteristics. There are also new needs for standards around protocols and information models for distributed resource integration. This tutorial focuses on the next generation challenges for Distribution Management Systems in order to truly integrate distributed resources.

Aim of the tutorial

This tutorial will review important Advanced Distribution Management applications that are driving the value for Distribution Management Systems and are establishing the requirements for these systems. A particular focus will be on the new challenges (modeling, protocols, advanced algorithms, protection, etc.) associated with integrating distributed resources as part of the normal planning and operation of the distribution system. Finally, we will have a utility perspective and a discussion with the attendees about addressing these challenges.

Content

The course will provide an overview of applications, integration approaches, and requirements for advanced distribution management systems. A significant focus will be on technologies and approaches for the modeling and simulation requirements to support real time model-based
management of future dynamic distribution systems with the integration of distributed resources. The following sections are planned for the course:

1. Overview of Advanced DMS Applications and Requirements for Integrating Distributed Resources - Mark McGranaghan (EPRI, USA)

2. A Review of Advanced DMS Characteristics and Requirements and Utility Perspective - Christian Noce (Enel, Italy)

3. Modeling and Simulation Needs for Incorporating Distributed Resources into both Planning and Operations Systems - Roger Dugan (EPRI, USA)

4. Managing Active Distribution Networks with Distributed Resources – Graham Ault (Smarter Grid Solutions, UK)

5. Discussion

Expected benefits

Participants will gain an improved understanding of:
- Functional Requirements and Integration Issues for Advanced Distribution Management Systems
- Important applications for Advanced Distribution Management Systems and the specific requirements for integrating distributed resources.
- Advanced system modeling and simulation approaches to support Distribution Management Systems with distributed resources
- Practical implementations and utility perspectives for dealing with these challenges

Who should attend

This tutorial is intended for power systems engineers and managers who have responsibility for the design, management, and operation of distribution systems.

Support material

A copy of all the presentation material used in the tutorial will be supplied to delegates.

About the presenters

Mark McGranaghan (mmcgranaghan@epri.com) and Roger Dugan (rdugan@epri.com) are with the Electric Power Research Institute (United States) and are responsible for research in the area of smart distribution system development.

Graham Ault (gault@smartergridsolutions.com) is with Smarter Grid Solutions where they have been implementing advanced distribution management functionality in the UK, North America and elsewhere.

Christian Noce (christian.noce@enel.com) is an expert in distribution automation at Enel and coordinates Enel research activities in this area.