

# Overview of the IEEE Tutorial on Probabilistic T&D System Reliability Planning, June 24-28, 2007, at the PES Annual General Meeting in Tampa, Florida

## **Overview**

Historically the development of transmission and distribution systems was largely undertaken using deterministic planning and design criteria. Though easy to use, the drawback of deterministic criteria is that they results in the expensive design of power systems that can be under-utilized except for very short periods of high electricity demand. The deterministic criteria served electric utility industry well in the past when the utilities provided bundled services to customers. In the current era of intense price and service reliability competition under the deregulated market environment, the deterministic transmission and distribution system reliability planning criteria are no longer valid. In order to be able to provide customers with the optimum service reliability at the right cost, the movement towards reliability based planning criteria and models are inevitable. Consequently, a tutorial related to this area is very timely and is expected to attract a large attendance.

Significant advances have been made in the last few decades in the development of probabilistic concepts, theories, models, collection of power system equipment outage and customer interruption cost data, and sophisticated computer programs that permit numerical assessment of transmission and distribution (T&D) systems reliability performance. This tutorial brings together instructors from academia and industry, who are able to provide a wide range of expertise on reliability techniques and applications. It summarizes the transmission and distribution systems reliability concepts and models that have been developed over the past forty years. Further, this tutorial presents the basic concepts and the recent developments in quantitative value based evaluation of transmission and distribution systems, and illustrate the practical applications of these techniques by utilities. The basic requirements of equipment outage and customer interruption cost data, and mathematical models in performing system reliability assessments are extensively covered in an easy to understand manner. The theories and models are illustrated using practical system examples. This tutorial would prove useful to anyone interested in gaining deeper understanding of transmission and distribution systems reliability and engaged in the business of electric energy systems- practicing engineers, regulators, transmission service providers, energy traders, students and academics. The materials presented in the tutorial strike a balance between basic reliability theories and their practical applications, and are presented by some of the renowned experts in the power system reliability field.