

Presentation # 10

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Title: Planning of the Smart Distribution Grid

Abstract

This paper discusses a conceptual framework for planning the smart distribution grid. The analyses and discussions cover the methodologies and computational tools that are required for bridging the gap between the existing system and the smart distribution grid. The necessity of an integrated distribution system planning approach for designing a robust, reliable and resilient smart distribution grid is addressed.

The smart distribution grid aims at satisfying multiple objectives such as, but not limited to, minimizing supply cost, improving system reliability and power quality, reducing average technical losses, optimizing voltage profiles, etc. These objectives can be achieved through the implementation of modern distribution analysis functions, real-time monitoring and control and advanced automation schemes such as Fault Location, Isolation and Restoration (FLIR) and Integrated Volt VAR Control (IVVC). This implies planning for a robust, reliable, flexible and resilient distribution grid that supports the implementation of these functions and schemes by providing, for instance, multiple alternatives for automatic feeder reconfiguration and restoration, as well as real-time monitoring and control. Transitioning from a conventional distribution system to a grid with these characteristics requires building new distribution lines and feeder ties and installing new smart distribution switching and protective devices, distribution equipment, sensors, and smart meters.

Therefore, it is required to have methodologies and tools that aid planners in defining the plans and strategies that will be followed for ensuring a successful transition toward a smart distribution grid and in ensuring the achievement of predefined goals. These methodologies and tools must help answer questions such as: how many new feeder ties or distribution lines are needed and where should they be located? How many and what type of smart devices are needed and where should they be located? How many and what type of sensors and meters are required and where should they be located? Moreover, they must provide planners with a means for assessing the costs and expected benefits of the proposed smart grid alternatives, as well as simulating different scenarios. This will allow decision makers to select the level of implementation and features of the smart distribution grid that better fit the overall utility goals.