The 14th International Workshop on Electric Power Control Centers
Wiesloch, Germany, May 14-17, 2017

ADAPT for Active Distribution Networks

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Abstract;

United Kingdom Power Networks (UKPN) provides power to a quarter of the UK's population via its electricity distribution networks in London that span to the east and southeast of England. This talk will present an advanced distribution analytics power network tool (ADAPT) co-developed by BSI and UKPN. ADAPT is an advanced real-time monitoring, state estimation platform armed with contingency analysis, corrective control, and a portfolio of analysis and operational tools. In addition, the look-ahead platform (30 minutes to 2 hours ahead up to 24 hours ahead) offers forward time horizon assessment of the network taking into account uncertainties of renewable energy. ADAPT is complete with energy forecasting tools which provide input into forecasting future system cases (e.g. 1 hour ahead to 24 hours ahead). ADAPT is composed of the following key functions for active distribution networks: State Estimation, Power flow, Contingency Analysis, Interactive Single Line Diagram (132 kV, 33 kV, and external connections), Energy forecaster (for load, solar, and wind), Corrective control for removing violations in the system, and a proprietary Data Bridging engine which merges of DMS output files and Planning tool files to be input into the platform. Implementations of the BSI ADAPT are configured for each of UKPN's three required operation modes: (i) Real-time mode (reliability management using on-line data), (ii) On-line Study mode (infrastructure planning using historical data and archived on-line cases), (iii) On-line Look Ahead mode (outage planning using forecasted data).

The ADAPT platform provides operators and engineers real-time situational awareness and facilitates network reliability management as new distributed generation comes online. It also enhances the capability of outage planners to minimize constraints placed on the output from distributed generators during the summer maintenance season and during any major construction and reconfiguration activities. The Look-Ahead mode allows engineers to include the uncertainty of renewable output as well as energy forecasting to produce forward looking cases with new renewable contingencies and alternate dispatch cases. Some challenges faced during the development of ADAPT will also be presented. A by-product of the tool's analysis capabilities can also identify root causes of system and component power losses as well as ways to minimize them.