IEEE Open Access Journal of Power and Energy, vol.7, pp.478-488, .

Building highly detailed synthetic electric grid data sets for combined transmission and distribution systems

H. Li; J.L. Wert; A.B. Birchfield; T.J. Overbye; T. Gómez San Román; C. Mateo Domingo; F. Postigo Marcos; P. Dueñas Martínez; T. Elgindy; B. Palmintier

Abstract-

This paper introduces a methodology for building synthetic electric grid data sets that represent fictitious, yet realistic, combined transmission and distribution (T&D) systems. Such data sets have important applications, such as in the study of the wide-area interactions of distributed energy resources, in the validation of advanced control schemes, and in network resilience to severe events. The data sets created here are geographically located on an actual North American footprint, with the end-user load information estimated from land parcel data. The grid created to serve these fictional but realistic loads is built starting with low-voltage and medium-voltage distribution systems in full detail, connected to distribution and transmission substations. Bulk generation is added, and a high-voltage transmission grid is created. This paper explains the overall process and challenges addressed in making the combined case. An example test case, syn-austin-TDgrid-v03, is shown for a 307,236-customer case located in central Texas, with 140 substations, 448 feeders, and electric line data at voltages ranging from 120 V to 230 kV. Such new combined test cases help to promote high quality in the research on large-scale systems, particularly since much actual power system data are subject to data confidentiality. The highly detailed, combined T&D data set can also facilitate the modeling and analysis of coupled infrastructures.

Index Terms- Power systems modeling, synthetic power grids, integrated transmission and distribution

Citation:

Li, H.; Wert, J.L.; Birchfield, A.B.; Overbye, T.J.; Gómez, T.; Mateo, C.; Postigo Marcos, F.; Dueñas, P.; Elgindy, T.; Palmintier, B. "Building highly detailed synthetic electric grid data sets for combined transmission and distribution systems", IEEE Open Access Journal of Power and Energy, vol.7, pp.478-488, .