

Electric Grid Cascading Outage Analysis

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Abstract

The electric grid of the United States is a complex system consisting of interconnected networks owned by four hundred fifty entities spanning the country. The electric grid is designed to handle single contingencies; however, two contingencies in close proximity to a critical location could cause a cascading outage. Therefore, analyzing the electric grid for cascading outages and upgrading those sections of the grid will decrease the likelihood that the electric power grid will have a repeat occurrence of the blackout of 2003.

Working with the company Commonwealth Associates Inc., our project focuses on approaching the problem question, “Where do cascading outages exist?” with the following objectives: Identify critical points that can cause a cascading outage, propose a modification to remove critical points, and provide insight into the various methods of helping prevent cascading outages. Provided with the software TRANSMISSION 2000 and real case data from the U.S. Western Electric Grid from Commonwealth Associates, Inc., a particular city from inside the Western Grid has been chosen for the project focus. Within TRANSMISSION 2000, Power Flow and Contingency Processor are cascading outage analysis tools which are being used to identify problem areas consisting of double contingencies as the electric grid is built to withstand single contingencies. Over the course of identifying critical points and proposing modifications, our senior design team will continually be working with power engineers at Commonwealth Associates Inc. for assistance to reach the objectives.