Energy Management System for a Reconfigurable 32 Bus Distribution Network

Submitted to Dr. Karen Miu and the Senior Design Project
Committee of the Electrical and Computer
Engineering Department Drexel University

Team Number: **ECE-14**

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Abstract

At the request of the CEPE, we have created an Energy Management System for a reconfigurable thirty-two bus distribution network. We configured a thirty-two bus network from the existing four nine bus networks in the RDAC power laboratory. Our Energy Management System allows students and faculty to more closely model and research a larger network in which they can perform power flow, network reconfiguration and service restoration techniques after faults that are commonly experienced in the field.

We created a software package using Visual Basic that enables us to perform and store measurements from a single server station for the entire network. Our program controls the entire network's switching and allows us to reconfigure the network and provide multiple switching options in the event of a fault or loss of power.

The GUI consists of both visualizations and controls. Through our work, we created 4 new forms as well as altered approximately 10 existing forms. These forms lay the foundation for the interaction between the software and the user and are explained and displayed within this report. The controls portion of the project allows for the user to reconfigure the network through the opening and closing of switches. In order to do so, the software takes measurements of voltage magnitudes and phase angles at each bus between the switches to ensure that the switch can operate safely.

Debugging the clock signal from the DAQ cards was a major task last term and since we started early on, we were able to correct the problem with the time that was given to us. Throughout this process, we were able to communicate with National Instruments to ensure that both our hardware and software configurations were correct.

Pertaining to our budget, all necessary expenses have been covered by the Center for Electric Power Engineering (CEPE). Therefore, we have not incurred any out-of-pocket expenses for the project, nor has the budget been affected this term.

Overall, the project went as planned. As we reiterate from last semester, the only setback was our inexperience with Visual Basic 6.0. The learning curve demanded a large amount of time and so progress was slow early on. No major modifications were made to the schedule this semester. The creation of the GUI had overlapped with testing and modification, but in hindsight, this is more appropriate since modifications had occurred during the design phase.

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