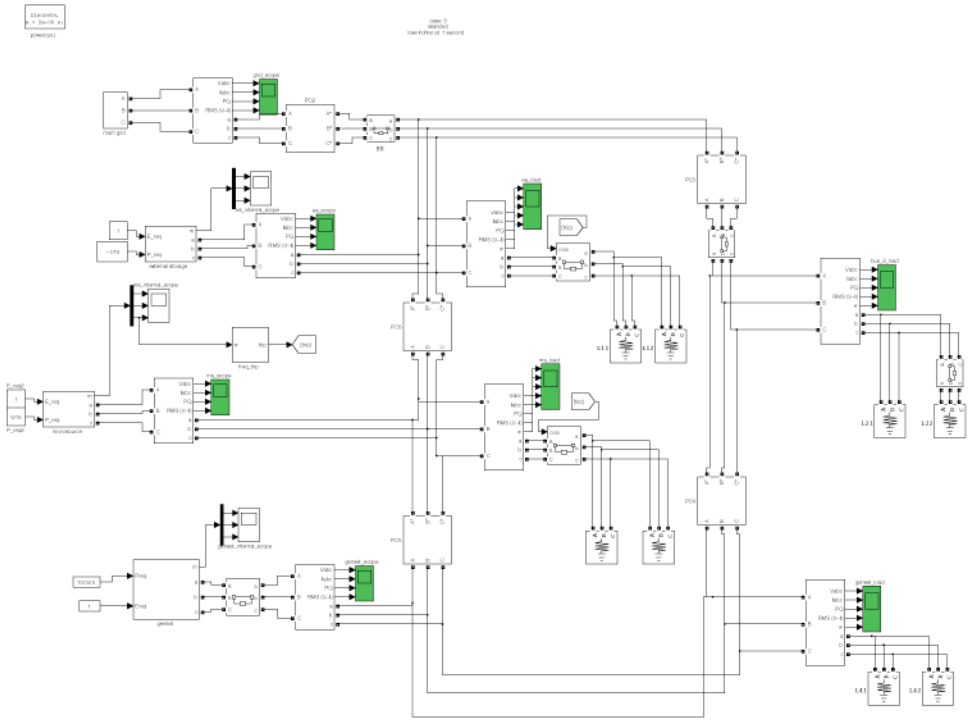
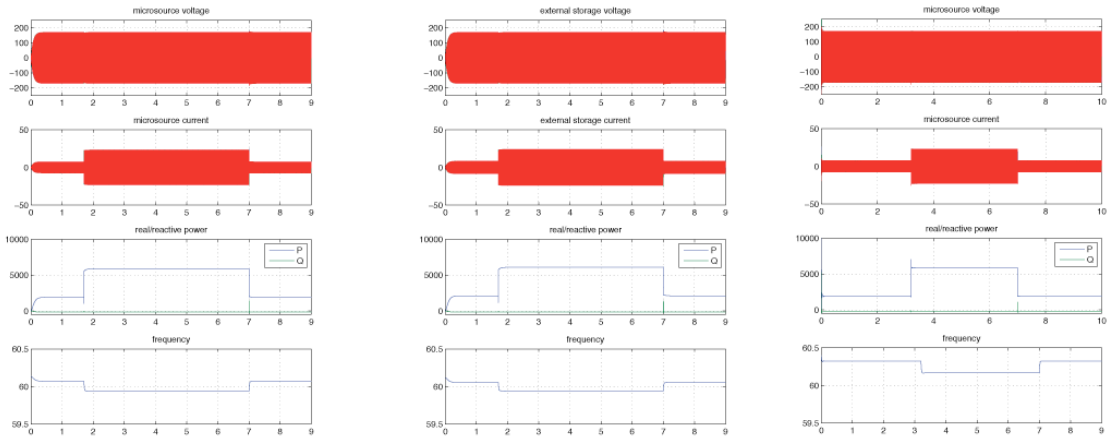
MONTHLY PROGRESS REPORT	
Contractor Name: University of Notre Dame (Michael Lemmon)	
Contractor Address: Office of Research, 940 Grace Hall, Notre Dame, IN 46556	
Contract/Purchase Order No. W9132T-10-C-0008 (prime contract no.)	Task Order No.
Project Title: Design and Simulation of Intelligent Control Architecture for Military Microgrids	
Period Covered: November 1 2010 – December 1, 2010	
POC/COR (Reference Paragraph 5 of the SOW):	
Achievements (Describe by task. Add additional tasks, if needed.): task numbers refer to tasks in Odyssian's original contract	
Task II: Model and Simulate Intelligent Microgrid 1) completed validation and testing of ND's 3-phase microgrid simulation against the test and model data supplied by UWM.	
Task III: Distributed Control Algorithm Development No activity	
Task VI: Develop Wireless Communication No activity	
Task VII: Develop Wireless Distributed Control no activity	
Problems Encountered (Describe by task. Add additional tasks, if needed):	
Task II: None	
Task III: None	
Task VI: None	
Task VII: None	
Open Items (List items that require action by the Contractor or the Government):s No open items	

Summary Assessment and Forecast (Provide an overall assessment of the work and a forecast of contract completion):

Comparison between UWM and UND simulation models has been completed. Comparisons were made against the stand-alone microsource (ms), externals storage (es), and genset models as well as the UWM mesh microgrid provided in earlier documentation. simPower block diagram for the ND model is shown below.

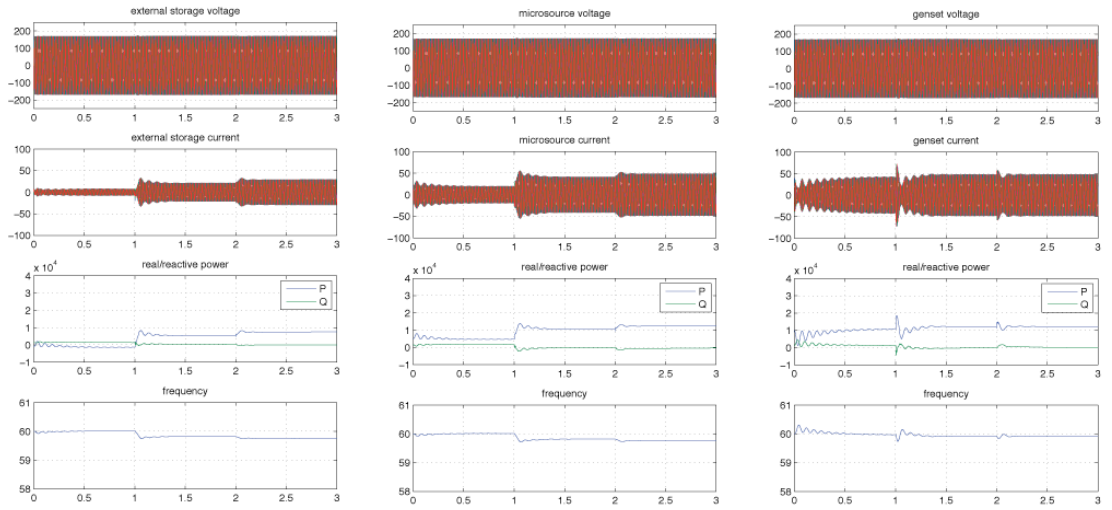


Simulation results for stand-alone components closely followed the UWM test results. Test results from ND's simulation are shown in the following plots. These plots closely follow similar results obtained by UWM for the real hardware.

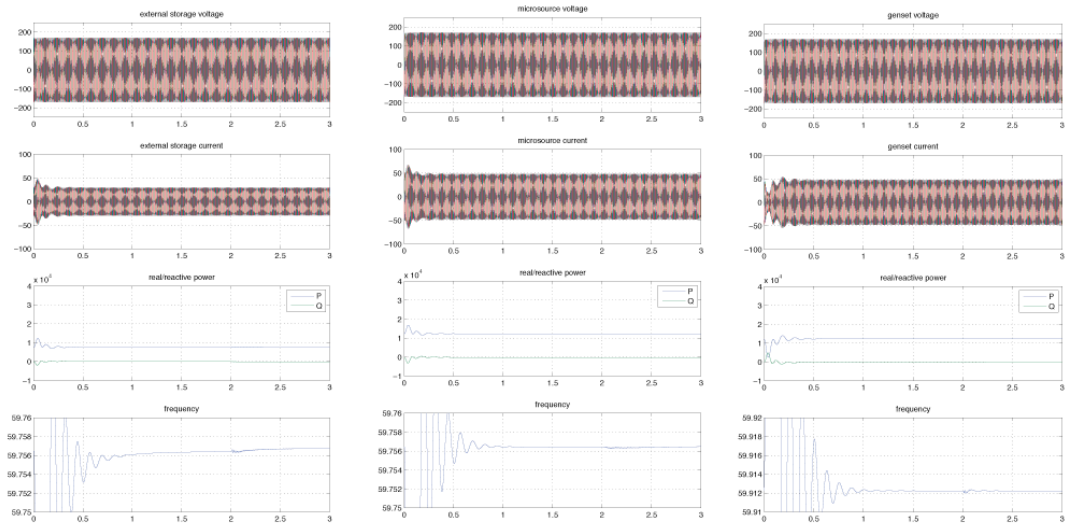


Simulation results from the simulated mesh microgrid closely followed that of the three test cases provided by UWM. These test cases are itemized below:

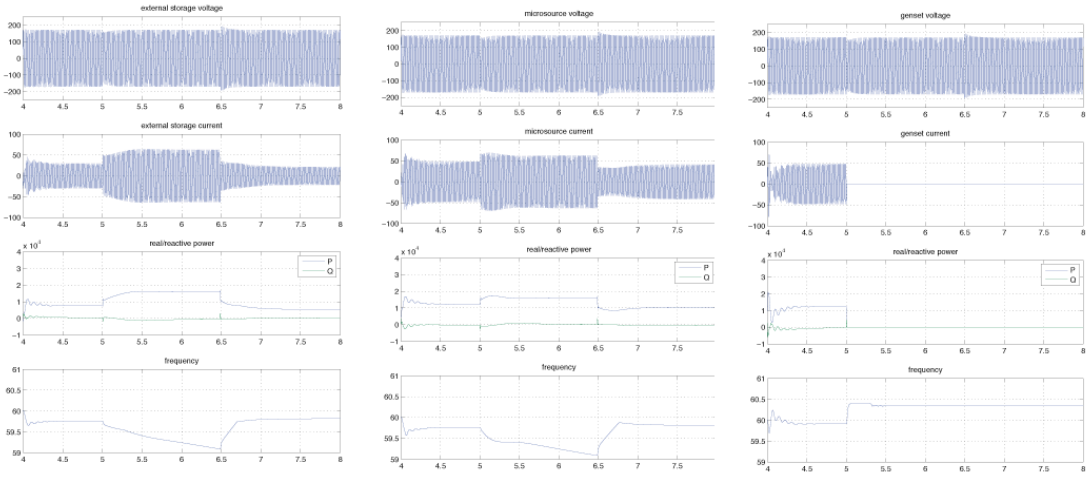
Case 1) initial 28 kW load with 18 kW imported from grid:
islanding at t = 1 second
additional 4kW load at t = 2.0 second



Case 2) islanded with 32 kW loading
open cable (PC3) at t=2 seconds



Case 3) Islanding at t=4 second with on-site 32 kW load
Genset lost at t=5 seconds
Low frequency trip at about t=6.5 seconds sheds 16 kW on bus 1 and 3



These simulated results for the ND simulation closely follow results obtained by UWM. Some small differences appeared with regard to the nature of the genset transients. These differences were small and may be attributed to differences in circuit models for cables and some of the genset saturation levels. ND's 3-phase simulation testing of UWM microgrid has been completed successfully.

Testing of case 3's load shedding was done using the frequency measurement generated by the UWM controller. Comparison against a simple zero-crossing counting algorithm for frequency estimation suggested that the current approach being used by Odyssian for frequency estimation may be too coarse for timely load shedding.

Future work will integrate the distributed dispatch algorithm into the validated microgrid simulation. Future work will also develop a preliminary document specifying the software/hardware architecture that should be used in building the computational agents realizing the dispatch and intelligent load shedding algorithms.