Summary on Smart Secure Grid Workshop 3/10-11/2009 at Fort Collin

The workshop is well organized with panels from local utility, state, federal and military representatives. Dr. Ron Sega tries to organize a regional smart secure grid project to bid for DoE and DoD funding in the stimulus package, taking advantages of the existing energy initiatives and strength of a local spirae who has worked on Denmark to improve their power grid infrastructure. Military organization and bases has as 2007 mandate to improve its capability to be self energy sufficient and disengaged from general power grids on civic utility side, in case of power disruption during natural or man-made disaster, they called islanding. There are quite a few top military officers from Northcom as our national power grid is aging and has quite a lot of security vulnerabilities that can be easily exploited and has significant long lasting impact due to availability of replacement parts that are difficult to produce and transport.

I believe UCCS can contribute by leveraging on our previous research results and funded project experience. Infrastructure security is important area that the workshop participants have consensus on. Another area is control and demand response. We have faculty members who have expertise in cyber and physical security that are directly related to infrastructure security for future smart grid design (Terry Boult, Edward Chow, Joe Zhou, NISSSC?). A group can be formed to looking into the next generation of secure protocol design and development for smart secure grids. Exploring the use of biometric for authentication and advanced camera system for monitoring surveillance of the transmission/power generation facilities. We also have faculty member worked on network restoration and survivability architecture (two US Patents), and network planning (Edward Chow, Charlie Wang). Dr. Greg Plett is an control expert with active project in energy storage research which is critical in future smart security grid. Faculty members in Mathematics Department may contribute to the optimal demand response algorithm development.

In terms of infrastructure security for smart secure grid, survivability and network planning in Telecommunication are related, has similar characteristics both in terms of network topology and control, and has been extensive studied, which we can draw on our previous research/project experience when create new secure infrastructure for the smart secure grid. 3/10/2009s workshop talk on WECC current operation indicating significant improvement can be made in terms of communications and control. Traffic demand and network planning has been formulated as Multicommodity flow problem, how its solution can be adapted to the demand response problem worth investigation.

Defense in depth is a known principle. The security of national power grid or our smart secure grid can be improved by using multiple levels of high voltage transmission lines, especially the lower voltages one with mobile replaceable transformers and redundant geographic routes. Algorithms for finding alternate paths can be developed with neural network/soft computing for semi-optimal solutions or even optimal solution for small regional grids.