

EMC and the Smart Grid

BY MARK MONTROSE

The smart grid is a rapidly emerging topic in the field of electrical and power engineering that affects everyone worldwide. The IEEE is actively engaged in the Smart Grid Form (<http://smartgrid.ieee.org/>).

The grid is an electrical network utilizing digital technology to deliver electricity from suppliers to consumers using two-way digital communications to control everything electrical at consumers' homes or industrial locations. The grid could save energy, reduce costs and increase reliability and transparency if risks inherent in processing massive amount information simultaneously are avoided. This is where compliance engineering may have a higher focus in the future. The "Smart Grid" is being promoted as a way of addressing energy independence, global warming and emergency concerns.


The Internet has made it practical to apply sensing, measurement and control with two-way communications related to electricity production, transmission and distribution all at a high technology level. In the future, generation of electricity will become a major concern for our survival. There may be a shortage of power worldwide if careful management from generation to utilization is not well managed.



The item of concern for engineers both today and in the future is to ensure reliable operation that is free from harmful interference or disruption. There are five major areas of challenge to ensure a reliable Smart Grid system is not disrupted by a transient or terrorist event. As example of a terrorist event is someone using the Internet to shut down the grid's communication systems. The following are opportunities for both safety and EMC engineers worldwide. The concern present is the manner of

testing large scale systems of systems from disruption throughout the frequency spectrum, and where in situ testing is not possible.

- **Integrated communication networks:** Elements of the grid communicating with each other.
- **Sensing and measurements:** Data communication received in the control center.
- **Terrorism:** Intentional or unintentional disruption; terrestrial (lightning), extra-terrestrial (solar flares), physical damage (natural disasters), or cyberspace (hacking into the infrastructure).
- **Using advanced components:** New technology for advanced capabilities.
- **Integrating Broadband Over Powerline (BPL):** Ensuring Wideband Local Area Networks signals present on power lines do not cause EMI to communication services.

With the Smart Grid network, our focus as compliance engineers, both safety and EMC, must be on determining what to work on first; emission or immunity threats, compliance with regulatory standards or electromagnetic compatibility, testing components or finished assemblies, incorporating functional safety, or implementing power saving features. A major concern for the industry is not having knowledgeable safety and EMC engineers to guarantee the grid never goes down. 

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