



## EMC Aspects in Smart Grids

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### Abstract

As is well known, the term “Smart Grid” indicates that power grids throughout the world are going to change, in hopefully a positive way. The emergence of distributed power generation sources due mainly to the introduction of renewable energy sources (mainly solar and wind), has shown that there is a need for a high speed communications network that monitors all power generators, all of the loads and even the transmission and distribution networks to determine the power flow within the grid. The increase in data rate is due to the addition of many sensors and also due to the rapid variability of renewable power generators.

Within most international standards organizations dealing with power systems, such as the IEEE, Cigré, and the IEC, there has been a great deal of activity to deal with many of the issues arising from the changes being applied to power systems throughout the world. Unfortunately other than dealing with problems that occur from time to time, there are very few organizations emphasizing the problems associated with electromagnetic compatibility (EMC) and Smart Grid. As those of us who work with EMC aspects know, we recognize that planning, design and standardization are very important to ensure that the final system works well without having to deliver fixes after the fact. It is also possible that some methods of achieving a smarter grid are not practical due to the levels of EMI that are likely to occur.

This tutorial will first discuss some of the EMC issues that have arisen in different parts of the world relating to Smart Grid. This will then be followed by a discussion of the progress accomplished in the United States in a program known as the Smart Grid Interoperability Panel (SGIP) that has an active EMC group known as the Electromagnetic Interoperability Issues Working Group (EMIIWG). Their work will be described, including their work products to date and their plans regarding the development of an EMC test program for Smart Grid hardware being introduced in the United States. In addition the work of Cigré Study Committee C4 will be mentioned, especially with regard to the EMC aspects of both wind and photovoltaic generation.