

A Methodology for Radio Noise Measurement and Modeling

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Noise floor of the radio frequency (RF) environment is an important factor to the electromagnetic compatibility and interference (EMC & EMI) analysis in mobile communications; its thresholds are used to derive the minimum signal level (MSL) for satisfactory operating condition of receivers in presence of noise and interference. Current thresholds used in EMC and EMI are based on the data dating back to the 1970's. Today, with the introduction new technologies and electronics devices in the high frequency bands, the RF environment is not the same as 40 years ago, as the variety of devices operating in the environment increases the sources of noise and more receivers are functioning in wide band digital mode. There are needs to review the current radio noise floor and to have a uniform, frequency independent method for producing comparable, accurate and reproducible results between different measurement systems.

This work introduces a methodology and procedure for noise modeling and measurements, which leads to the comparable results and can be used to define emission limits on the amplitude probability distribution (APD) of the interference to protect communication systems. Some measurements for the validation purpose have been done in the National Capital Region (NCR) of Canada. These measurements serve principally to illustrate the applications of the procedure. In order to study the current noise floor across all regions, we are putting forward a program of intensive measurements covering many frequency bands, types of environment and including all components of the noise, which requires much more time and effort.